LUFTWAFFE COLOURS

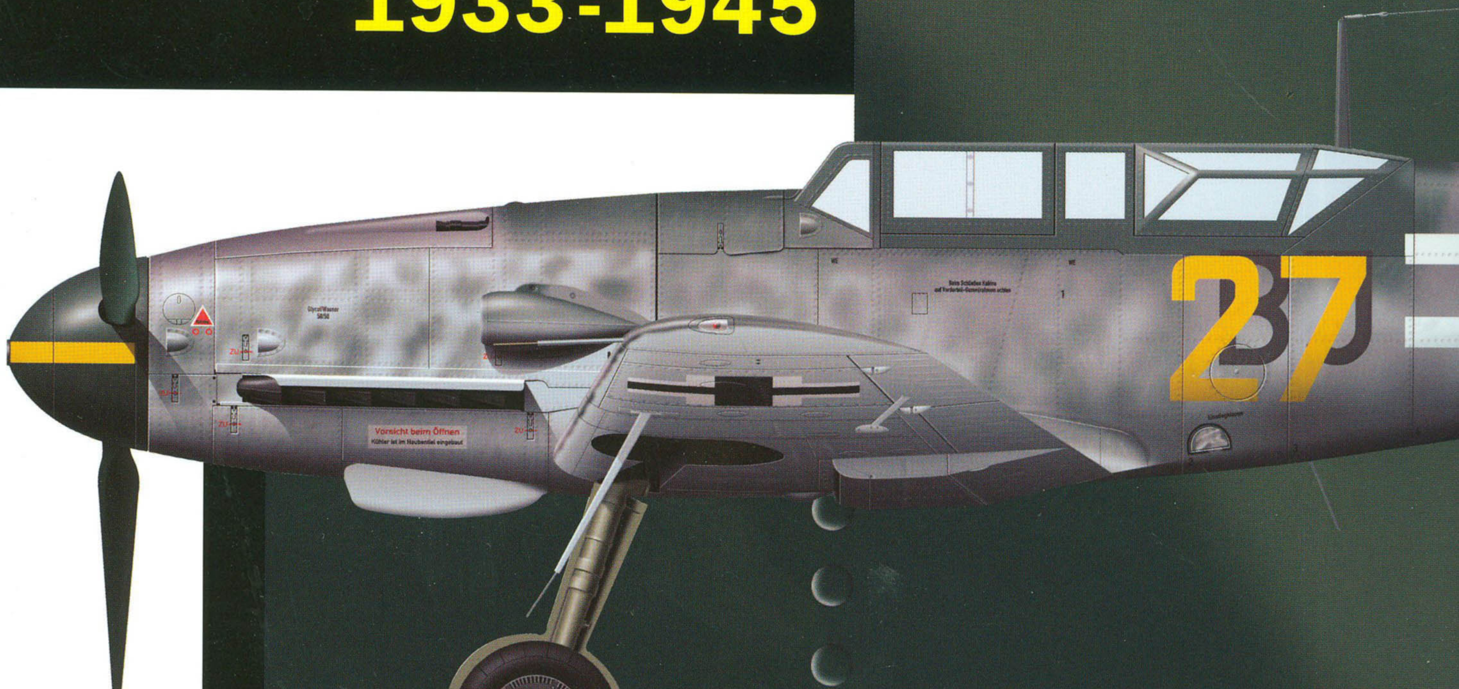
CLASSICOLOURS

FLEDGLING EAGLES

Barry Ketley

LUFTWAFFE TRAINING AIRCRAFT

1933-1945


27
Vorsicht beim Öffnen

1933-1945

LUFTWAFFE TRAINING AIRCRAFT

In 1939, advanced flying training to ready a pilot for operational service in the Royal Air Force took six months; by 1940, under the pressure of events, it had been reduced to three months.

At the height of the Battle of Britain, early on Monday 2 September 1940, Flying Officer A.T. Rose-Price arrived at Gravesend on his first operational posting. This was to 501 Squadron, then flying Hurricanes. Late on the afternoon of that same day, 501 Squadron, along with several others, was scrambled to intercept a large incoming force of Luftwaffe *bombers, escorted by some 160 fighters. By 17.00, F/O Rose-Price was dead, having been shot down in his aircraft, L1578, somewhere near Dungeness. He remains missing to this day.*

Helmut Rix made his first solo flight on 15 July 1943. For the next fourteen months he spent much time training as a potential bomber pilot by flying heavy aircraft such as the Junkers W 34 and twin-engined Junkers Ju 88 and Caudron C 445 types. In early September 1944 he was posted to Pretsch for re-training on single-engine types. In late October he was sent to Altenburg where he was introduced to the Focke-Wulf Fw 190. There he made three flights in early November in the rare two-seat Fw 190 S. After less than five hours on the Fw 190, Fähnrich *Rix then joined 8./JG 301 on 12 January 1945, but did not fly again until 27 February due to a shortage of aircraft. On 28 February 1945 he moved to Stendal. From there he took off to intercept a raid by US Eighth Air Force bombers in Fw 190 D 'Red 4', W.Nr. 500111, at 10.15 on 2 March on his first operational mission; at 11.00 he was bounced by two P-51D Mustangs of the US 352nd Fighter Group. His aircraft caught fire and he was forced to abandon it near Aussig in Czechoslovakia. Despite burns, Rix was fortunate, for he survived to live for many years afterwards in his adopted home in England. He never saw his attackers.*

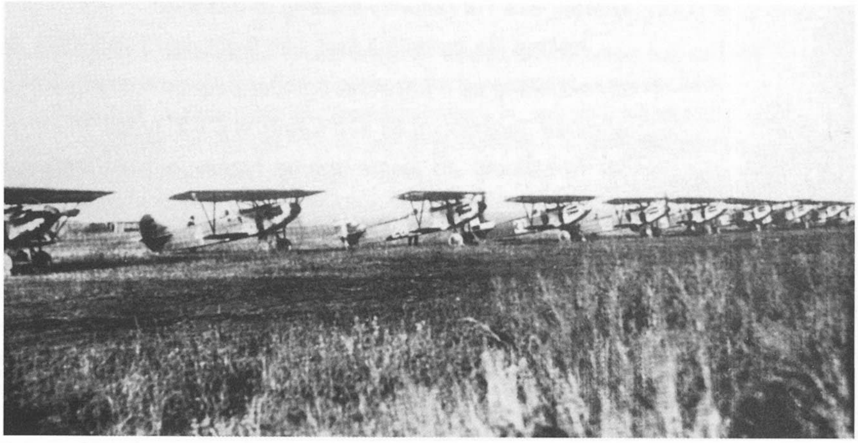
The two USAAF fighter pilots who shared the victory over Helmut Rix, namely Captain Lee E. Kilgo in 44-15390 PZ-K and 1/Lt Earl L. Mundell in 44-14091 PZ-M, had each had a minimum of 35 weeks training as a single-seat fighter pilot. Mundell had made his first victory claim back in July 1944, ultimately claiming 3.5. Helmut Rix represented Kilgo's first and only victory.

Prologue

The successful operation of military aircraft depends upon many factors, among them adequately trained air and ground crews, good aircraft in sufficient numbers, plus skilled leadership. Without these prerequisites an Air Force is little more than the keeper of some very expensive mechanical monuments. What the incidents related earlier tell us, is that properly trained aircrew are one of the most crucial elements in the exercise of air power. In the cases above, all the protagonists were flying state of the art aircraft, but the losers were only part-trained. Structured training of pilots, air and ground crews and the means to carry that out, is fundamental to the survival of an air force. Despite this, training is a subject that has been largely ignored by historians. Nowhere is this more apparent than in the case of the German *Luftwaffe*, where the astonishing achievements of some of the pilots and the exotic nature of the aircraft of that organisation have fascinated writers and modelmakers to the almost total neglect of the supporting services, yet progressive failings in the training system from 1943 onwards were among major factors which were ultimately to prove fatal for the *Luftwaffe*.

D1094
D1184
D1184
D-1368
1184

Even though there were restrictions to flying in Germany under the Treaty of Versailles dated 28 June 1919 the training of pilots was still carried out clandestinely. Here, arranged in two neat rows are Udet U 12a 'Flamingos' which were operated by the DVS at Schleissheim near Munich and which from April 1927 were used to train new young pilots, who after a year's instruction would earn their B-2 certificates indicating they had passed the commercial pilot's course.



After the signing of the Treaty of Rapallo between Germany and Soviet Russia on 16 April 1922 a military agreement was made between the German and Russian governments which would give Germany secret facilities to test their aircraft. After some debate on 25 April 1925 a clandestine flying school and flight test centre was established near the spa town of Liptsk situated some 500 km (310 miles) south-east of Moscow. Extensive training was carried out between 1925 and 1933 with 125 fighter pilots and 100 navigators being trained. One of the most common aircraft used was the Fokker D XIII, a line-up of which is shown here at the airfield.

Until shortly before the official birth of the *Luftwaffe* on 1 March 1935, German air activity was totally geared to training; effectively, there were no operational military aircraft. Forced to secrecy by the terms of the Armistice following World War I, the covert military aviation organisations which were formed in Germany could only function under the camouflage of civilian activities. This hampered the development of both aircraft and tactics, although it did provide for large numbers of aircrew who had been semi-trained on a military basis. When the *Luftwaffe* sprang into being, fully formed as it were, the sudden appearance of squadron after squadron of fighters and bombers represented an apparently irresistible force which by and large deceived Hitler's potential enemies into acquiescing to his ever-more strident political demands. The reality, however, was rather different; the years of subterfuge and economic constraint had taken their toll. Despite the Nazi propaganda, German aircraft at that time were neither as formidable nor as numerous as was claimed. Indeed, it has been argued with some validity that the Czechoslovak Air Force might well have been able to hold its own against the *Luftwaffe* had the Czechs decided to resist in 1938. Be that as it may, Adolf Hitler's blatant self-belief and his expedient approach to politics led directly to the recognition by the military staffs that there would simply not be the time to build up forces in depth to sustain long campaigns before Germany found herself at war. In turn, this had great influence upon the development of the *Blitzkrieg* theory – massive and overwhelming strikes with all the forces available upon the key points of an opponent's armed forces that would rapidly overcome a numerically superior enemy. In this situation, therefore, it is easy to see how the requirements of a long-term training plan could be subordinated to the short-term need to use every available military asset, including reserves, in the first lightning assaults. Until the reverses in Russia, this great gamble appeared to have paid off, but once the war changed from one of rapid movement to one of steady attrition, Germany's enemies were given time to re-arm and re-train. Consequently, despite some imaginative delaying stratagems, the German failure to prepare for a long drawn-out struggle was to prove terminal. To more fully understand the reasons for the failure at the end, however, it is necessary to go back to the beginning.

THE EAGLES IN THE EGG

Training – the accepted necessity

Even before the Nazi Party came to power in Germany, the *Reichswehr* already had secret plans for an air force of 1,000 aircraft. This was accompanied by the development of a sophisticated operational doctrine which envisaged a highly mobile combined army and well-balanced air force, which was to include strategic bombers as a major element and a modern air defence system. This was a far cry from the almost fossilised doctrines of the British and French military staffs of the time.

By 1935, under the leadership of the brilliant *Generalleutnant* Walter Wever and *Generalmajor* Helmuth Wilberg (who, incidentally, had a Jewish mother) the groundwork for the massive and arguably, over-precipitate, expansion of the *Luftwaffe* under Adolf Hitler had been set in place. Here, in passing, it should be noted that the new *Luftwaffe* was far from a Nazi puppet. The often incoherent Nazi ideology which envisaged war as the total annihilation of enemies had little influence on *Luftwaffe* doctrine; indeed *Luftwaffe* regulations specifically rejected 'terror' attacks on civilian populations and *Luftwaffe* Regulation 7: 'Directions for the Training of the *Luftwaffe*' paid only lip service to political education. In fact, the officer training curriculum of the *Luftwaffe* General Staff College allowed only 2 per cent of its time for such activity – and this was shared with military law, administration and public relations.

With Adolf Hitler's rise to power in January 1933, the nascent *Luftwaffe* was faced with its first hurdle – training sufficient officers for the envisaged Air Force. Thanks to the efforts of *Oberst* Hans-Jürgen Stumpff, however, this was expanded from 550 officers in 1933 to several thousand by 1938. Many of these had a far broader appreciation of aviation and air power than their opposite numbers in the RAF and *Armée de l'Air*. These results were achieved by the establishment of an Air Ministry in May 1933 which absorbed all the flying schools previously operated by the DLV (*Deutsche Luftsportverband*) and DVS (*Deutsche Verkehrsfliegerschule*), plus the secret training installations at Braunschweig, Schleißheim, Würzburg, Jüterbog and Warnemünde as well as taking control over all civilian flying. On 1 April 1934, an Inspectorate of flying schools was formed, under the command of World War I naval ace Friedrich Christiansen, and by summer it controlled a large and rapidly expanding infrastructure responsible for training air and ground crews.

Backed by the apparently bottomless purse of the Nazi Party and headed by a highly competent General Staff, the *Luftwaffe* would have been totally irresistible by the outbreak of World War II, but on 3 June 1936 disaster struck; Walter Wever, the first Chief of Staff of the *Luftwaffe*, was killed in an air crash at Dresden while on a tour of inspection. Apart from the loss of a brilliant and well-liked officer with a clear vision of the role of air power, the accident prompted a greater disaster still when the Commander-in-Chief of the *Luftwaffe*, Hermann Göring, began to assert direct control over the organisation. A World War I fighter ace, Göring

Generalleutnant Walter Wever, the first Chief of Staff of the Luftwaffe.

Generalmajor Helmuth Wilberg was the first organiser and General der Flieger in Spain.

Friedrich Christiansen, awarded the Pour le Mérite in WW 1, became Luftwaffe Kommandeur der Fliegerschulen in 1937.

Hermann Göring scored 22 victories in the First World War and was also awarded the Pour le Mérite.

Generaloberst Erhard Milch.

Generalleutnant Ernst Udet, who in 1939 became Generalluftzeugmeister.

had neither the temperament nor the ability to run such a technical service as the *Luftwaffe*, but he did have well-honed political skills and much ambition. The immediate result was the appointment of a number of Göring's cronies to senior positions and subsequently much in-fighting among the new leadership. Some, such as Ernst Udet, were manifestly incompetent. Others, such as Erhard Milch, were empire-builders. As a consequence, the harmonious and skilled leadership developed before Wever's death was lost and the seeds of ultimate defeat were already sown.

One aspect of air doctrine which had of necessity been largely neglected by the *Luftwaffe* was night-fighting operations. This shortcoming was, however, recognised by one of the most capable of the new appointees, Albert Kesselring. Under his direction and following extensive night exercises in June 1936, the *Luftwaffe*'s first manual of night fighting was published in April 1937. Kesselring was also a staunch supporter of long-range strategic bombing and was instrumental in securing the further development of such aircraft after they had earlier been abandoned due to lack of suitable engines. By late 1937, however, the *Luftwaffe* leadership was already beginning to fragment, thanks to the machinations of Milch and Udet's incompetence. Wilhelm Wimmer and Wolfram von Richthofen, both highly regarded and capable technical officers, soon fell out with Udet and asked for re-assignment. Kesselring himself found it impossible to work with Milch and was given command of the Air District around Dresden. Even more significantly, Hans-Jürgen Stumpff, who had been in charge of the *Luftwaffe* Personnel Office since 1933, fell out with Milch over the issue of lack of clarity in the chain of command. Stumpff proposed that command and operations, war planning and training be the responsibility of the *Luftwaffe* Chief of Staff (Stumpff), while production and all other matters remained with Milch. Milch for his part disagreed, being reluctant to relinquish control and counter-proposed a new Inspector-General who would be the 'eyes and ears' of the *Luftwaffe* Commander-in-Chief i.e. Göring. Stumpff was further undermined by a proposal sent directly to Göring by *Oberst* Hans Jeschonnek, chief of the operations staff of the *Luftwaffe,* in which Jeschonnek argued that the General Staff should concern itself only with operations and planning. Disheartened by the constant bickering, Stumpff gave up his post and was replaced by Jeschonnek in 1939.

Despite being regarded as a brilliant officer, Jeschonnek's youth (only 40 at the time of his appointment) and lowly rank made it difficult for him to deal with older and more experienced officers such as Kesselring and von Richthofen. Not only was he regarded as wrong in his view on the extent of the General Staff's responsibilities, he was not helped by his uncritical obedience to, and support for, Adolf Hitler. Jeschonnek's influence upon the *Luftwaffe* was almost totally negative. Not only did his vision of air power prove to be deeply flawed, but his over-emphasis on the concept of *Blitzkrieg* blinded him to any necessity to plan for anything other than short and violent campaigns. If this meant concentrating on combat aircraft to the neglect of training and transport and reconnaissance assets, so be it. In refusing to countenance anything other than the brief and victorious campaigns envisaged by his

Generalfeldmarschall Albert Kesselring became Chef of Luftflotte 1.

General der Flieger Hans-Jürgen Stumpff, Chef der Luftwehr.

General der Flieger Wolfram von Richthofen.

General der Flieger Wilhem Wimmer was Kommandeur der ostpreußischen Luftstreitkräfte and later Feldzuges Kommandeur der Luftflotte 1.

General der Flieger Hans Jeschonnek, Generalstabschef der Großdeutschen Luftwaffe.

leader, Hitler, Jeschonnek effectively made the *Luftwaffe* a hostage to fortune. In 1943, his realisation that his unquestioning adoration of Hitler had placed the *Luftwaffe* in an impossible position prompted his ignominious suicide, but by then, irremediable damage had been done.

Training – the neglected necessity

After Munich in 1938 Hitler had directed that the number of operational squadrons should be expanded fivefold. Given this overriding priority following on a reorganisation of the *Luftwaffe* General Staff in early 1939, the training element of the *Luftwaffe*, Branch 3, was restricted to tactical training in order to perfect the striking power of the new force. Longer-term pilot training was handed over to the newly created office of Chief of Training, who reported directly to the Inspector General of the *Luftwaffe*, Erhard Milch. A further reorganisation of the *Luftwaffe* in April 1939 into what was to become a war footing led to the creation of *Luftflotten* (Air Fleets), each occupying a specific area of the Reich.

Reichsmarschall Hermann Göring shakes hands with Adolf Hitler during a pre-war celebration.

From 1938 the relationship of the German training system to the operations structure developed flaws. Incredibly, the Chief of Training did not control the training units. The commander of each *Luftflotte* was responsible for the training schools and equipment in his area. Naturally, under the influence of Hans Jeschonnek, the operational commanders were far more interested in the fighting force rather than the training system which only offered long-term benefits. Following the outbreak of war, the pressing need to sustain the *Blitzkrieg* rapidly led the *Luftflotte* commanders to pluck the highly-skilled flying instructors and their aircraft from the schools to serve as transport or courier units. Continued requisitioning of skilled instructors to meet the demands of a desperate shortage of transport pilots led to a great weakening in both the quality and number of trained aircrew leaving the schools. From 1942, the effects of fuel shortages began to make themselves felt. Operational needs came first, and the training schools were at the end of a very long queue. Protests to the *Luftwaffe* Chief of Staff, by now *Generaloberst* Hans Jeschonnek, brought the reply 'First we've got to beat Russia, then we can start training!'

Throughout its existence, the *Luftwaffe* suffered from a high rate of landing and take-off accidents, compounded by the natural tendency of young men to take risks. In the early days, the rapidly expanding *Luftwaffe* was not as disciplined a force as might have been desired; over-confidence and showing-off led to many, too often fatal, accidents. *Reichsmarschall* Göring referred to it as 'a plague'. Those who survived often became highly skilled through a combination of natural ability and the German system of war service which meant that aircrew could operate for years without ever being rested. As a result, individuals could become superbly skilled, but their expertise and experience was not passed on properly to the newer crews.

To some extent, the failures of the training system were offset by the application of tactics which sometimes demonstrated a brilliant ability to improvise, but as the war progressed the pressures mounted. Shortages of equipment could be made up to a degree by expanding the number of production centres. Shortages of skilled personnel were not so easily rectified. There was little purpose in expanding the number of training schools when to produce a good fighter pilot needed one year of training, and a bomber crew up to two.

During 1943 the training programmes were just about adequate, but by 1944, ironically just as aircraft production was reaching an all-time high, the effectiveness of the pilots was falling hopelessly behind. By this time the average German fighter pilot was receiving about 160 hours of flying training before being hurled into action, while the opposing British and American pilots were completing about 360 and 400 respectively. Little wonder then that the losses among German pilots began to escalate rapidly. The RAF had early recognised the dangers of enemy action over England interfering with aircrew training. As a result, most training was quickly dispersed to southern Africa, Canada and the United States, where activities could take place well away from any threat from the *Wehrmacht*. Unfortunately, for the *Luftwaffe*, such a favourable position was a luxury not to be had. Lack of familiarity with their machines, lack of skill in flying in all weathers and a progressively increasing number of opponents led to an accelerating decline which was only to end in the final extinction of the once proud *Luftwaffe*.

Men and Methods

Would-be aircrew recruits in the *Luftwaffe* quickly found out that the way to the stars required hard work. From 1935 onwards, the usual precursor to the *Luftwaffe* was a preliminary period of road-building and ditch-digging with the paramilitary RAD (*Reichsarbeitsdienst*) labour service. Alternatively, many of the more keenly air-minded opted for a period of training and indoctrination, which offered some basic flying training on gliders, with the NSFK (*Nationalsozialistiches Fliegerkorps*), a civilian but Party-controlled organisation.

After induction into the *Luftwaffe* proper, all young recruits, including officer candidates and ground personnel, were sent to an FEA (*Fliegerersatzabteilung*), later FAR (*Flieger-Ausbildungsregiment*), for basic training in military discipline and physical culture lasting some six - twelve months. The only air aspects to be introduced were in the form of lectures on radio and map reading. Later in the war these courses were abbreviated to two or three months only.

On passing out from the FAR, those recruits deemed to be suitable for flying training would be sent to a pool known as a *Fluganwärterkompanie* for about two months where they studied general aeronautical subjects. Officer candidates would be sent to a *Luftkriegsschule* (LKS).

At this point some explanation should be made of the various types of pilot licences issued by the *Luftwaffe*. Apart from the three grades of glider pilot licence issued by the NSFK, the basic powered aircraft A1 certificate required that the trainee complete a loop, three landings without an error, an altitude flight to 2,000 m, and a 300 km triangular flight course. All of these were to be accomplished in 1-2 seat aircraft weighing up to 500 kg.

A2 certification was similar except that it was for aircraft with at least two seats. Most pilots in the *Luftwaffe* trained on dual-control machines, therefore this was the usual starter qualification. Following on from this was the B1 certificate. To obtain this, the student had to show that he had already achieved at least 3,000 km of flight experience, a 600 km triangular course in nine hours, an altitude flight to 4,500 m, and at least 50 flights in aircraft in the B1 category. (Single-engined 1-3 seater with a maximum weight of 2,500 kg). On top of this experience, the pilot had to carry out three precision landings, two night landings and a night flight of at least 30 minutes.

The B2 certificate was progressively more difficult, requiring 6,000 km of flight experience, including at least 3,000 km on B1 class aircraft. In addition 50 further night flights were necessary, which had to include several difficult night landings.

To fly the larger multi-engined aircraft demanded the C licence. This required a minimum of 20,000 km flown in B-class aircraft (single-engined, 1-6 seats, weighing up to 2,500 kg), 6,000 km of which had to have been flown as first pilot. Not only this, the student had to complete a further 30 flights in C1 class aircraft (single-engined, 6 seats weighing over 2,500 kg) and display a good general knowledge of aviation communications.

Ultimately, the most difficult certificate to acquire was the C2 which demanded the C1 licence as a prerequisite, plus an additional 30 training flights, several 800 km triangular flights, two flights on one engine only, and a 200 km night flight.

From the above, it is self-evident that good quality pilots, especially those flying the multi-engined bomber and transport types, were not to be found quickly. Instructors capable of teaching up to these standards were even rarer, especially after the constant plundering of the training schools to supplement military operations. The shortage of qualified instructors led directly to inefficient training and a high wastage rate amongst the students, possibly as high as 25 per cent.

Back to the new student, however, who after being accepted for flight training would be posted to a *Flugzeugführerschule* A/B (FFS A/B) for 100 to 150 hours of primary training on A-2 and B-1/2 aircraft. At least, this was the theory – by the end of the war this was down to 40 hours, giving the teenage pilots no chance against the seasoned Allied pilots. The first five hours were dual, followed by another 25 hours or so practising circuits and bumps, take-offs and landings and simple turns. Usual mounts for this were forgiving Bücker and Klemm types. As the pupil gained experience, he was closely observed to determine what his aptitudes were, as these determined the next stage of training after he first gained his pilot's badge.

One peculiarity of the German training methods worth noting was that the primary trainers were not fitted with an intercom system between the pupil and instructor. Unlike the RAF, whose most basic trainers had at least a Gosport tube to facilitate communication between the occupants, the *Luftwaffe* relied upon a system of hand signals. As can be seen by study of pictures in this book, helmets worn by *Luftwaffe* ab initio trainees had no provision for headphones.

Prospective fighter pilots were passed on to a *Waffenschule* for three to four months where they carried out some 50 hours of flying on different types, eventually leading to training on semi-obsolescent operational types. By the time they were posted to an operational squadron, still without any combat experience, they would have flown for some 200 hours.

Dive bomber pilots were posted to the appropriate *Stuka Vorschule* for a course lasting four months during which they carried out about 15 dual practice dives before going solo. The physical strain imposed on the body during this limited the maximum number of solo dives permitted in a day to fifteen. The main purpose of the course was to achieve bombing accuracy; navigation and tactics were secondary.

Bomber and reconnaissance pilots were sent to FFS C schools where the training was on twin-engined aircraft. Lasting from three to six months, the course allowed for about 60 hours of flying by day and night, including cross-country and some blind flying. On completion of this stage on obsolescent types, the pilot went for a further six weeks to a specialist *Blindflugschule* where there would be another 50-60 hours of blind-flying practice. The final stage was about three months at a specialist bomber or reconnaissance school where complete crews were trained on current operational aircraft types. Having passed through some 250 hours' flying during a course lasting anything between 18 months to two years, the crews were eventually posted to an operational squadron.

The special requirements of marine pilots demanded a rather different approach in so far as their training, right up to 'C' certificate level, usually took place at the same base. Consequently, a much larger variety of aircraft could be seen at the *Flugzeugführerschulen (See)*.

A glaring omission from this training schedule was that for transport pilots. Notwithstanding the preoccupation of the *Luftwaffe* High Command with offensive operations, the logistics needs of modern war were grossly underestimated. It should be noted, however, that the *Luftwaffe* was not alone in this misapprehension; the RAF did not form Transport Command until 1943. As a result of this oversight, apart from having to remove skilled instructors from the flying schools, until 1943 transport units were classified as *Kampfgeschwader zur besonderen Verwendung (KG zbV)* – literally 'Bomber Unit on Special Duties'! Belated recognition of the need for specialist training only took place in July 1942 when KGr zbV 300 was formed as a training unit. It lasted until May 1943 when a specialist *Ergänzungstransportgruppe* was set up. This existed for about a year until it had withered away to little more than *Staffel* strength by late 1944.

One other aspect of aircrew training should be mentioned here. In a direct link with the conventions of the First World War, the observer of a German bomber was to be the captain of the aircraft, the pilot being a mere chauffeur. Consequently, the observer had to be the most experienced member of the crew and capable of taking over the duties of other members in an emergency. His training was therefore both varied and comprehensive. Trained up to 'C' certificate standard as a pilot with 150 hours under his belt, he then attended a special observers school for intensive training in navigation, night and blind flying, bomb-aiming, radio operation and gunnery! Needless to say, the pressures of war soon brought about a reassessment of the duties of these paragons, and from 1942 onwards the amount of training an observer received began to decline. His status as aircraft captain was also removed and eventually a 4-6 month course was the norm.

As previously noted, once war began, training for the *Luftwaffe* began to fragment. Relatively efficient and well organised at the beginning, the system was geared specifically to the needs of short and sharp campaigns. Experience of the rasp of war quickly led to modifications. For instance it was soon recognised that there was a need for further training in tactics and familiarisation with the particular type of aircraft and unit the pilot was to be posted to. The result was the formation of numerous *Ergänzungsgruppen* (Operational Training Schools) which were linked to operational units, and numerous ad hoc specialist training courses such as anti-shipping. A major omission had been night fighting, which most definitely required specialist training, and typified the lack of foresight shown by the High Command (who had dismissed the idea of a prolonged night bombing campaign by the enemy as fantasy), while the development of new aircraft, weapons and tactics led to further proliferation.

The Elementary Flying Units

Prior to the outbreak of World War II the disguised training units went through the usual bewildering relocations and redesignations so typical of the birth pangs of the *Luftwaffe*. With the expansion of the Reich territories, a considerable number of the schools were moved east into newly occupied countries. Eventually, by September 1939, there were some

50 A/B flying schools in existence, many of which shared the same bases and names as the related FAR training regiments. In January 1940 many of these schools were redesignated by a number, presumably for increased security. (At this point it is worth noting that the flying schools frequently occupied more than one airfield. For example, A/B 8 based in Czechoslovakia used fields at Marienbad, Vilseck and Karlsbad). Subsequently, as fortune turned against Germany, many were merged to form *Doppelschulen* or were closed prior to the general collapse of the training system in 1943–44. Table 1 includes brief details of those A/B flying schools known from their designation date as such, but not in their earlier or associated basic training guise as Sch/FARs.

Table 1: **Luftwaffe Elementary Flying Training Schools**

School	First Formed	As A/B School	Main Bases	Comments
FFS A/B 1	January 1935	January 1940	Görlitz	A 1 from October 1943.
FFS A/B 2	October 1939		Magdeburg-Süd	Closed December 1939.
FFS A/B 2	June 1941	June 1941	Luxeuil, Strasbourg	New formation. October 1943 became A 2. Closed March 1945.
FFS A/B 3	1935	April 1939	Guben	FFDS A 3 October 1943 with A/B 113. Closed February 1945.
FFS A/B 4	October 1939	January 1940	Prague/Gbell	As A 4 from October 1943. Closed February 1945. To Neudorf/Oppeln September 1941.
FFS A/B 5	November 1939	January 1940	Seerappen	March 1941 merged with A/B 33.
FFS A 5	June 1944		Gablingen	Closed February 1945.
FFS A/B 6	October 1939	January 1940	Danzig-Langfuhr	Became Sch/FAR 52 September 1940.
FFS A 6	January 1944	January 1944	Rosenborn	Closed September 1944.
FFS A/B 7	1936	January 1940	Plauen/Chemnitz	June 1943 with A/B 10 as FFDS A/B 10.
FFS A 7	July 1944		Schweinfurt	Operational until March 1945.
FFS A/B 8	October 1939	January 1940	Marienbad/Vilseck	To Sch/FAR 63 October 1940.
FFS A/B 9	July 1939	January 1940	Grottkau	A 9 from October 1943. January 1944 with A32 as FFDS A 9. Closed February 1945.
Sch/FAR 10	January 1936	April 1939	Neukuhren	Merged with A/B 125 January 1941.
FFS A/B 10	January 1941		Warnemünde	With A/B 7 as FFDS from October 1943. A 10 from December 1944. Closed May 1945.
FFS A/B 11	January 1936	October 1941	Schönwalde	August 1943 with A/B 125 at Neukuhren as FFDS A/B 125.
FFS A/B 12	November 1938	October 1941	Königsberg/Neumark	A 12 from October 1943. With A 71 December 1943 as FFDS A 12. As FFS A 12 from December 1944. Closed February 1945.
FFS A/B 13	January 1936	October 1941	Neubiberg, Pilsen	Closed June 1943.
FFS A/B 14	November 1938	October 1941	Klagenfurt/Aigen	Closed March 1945.
Sch/FAR 21	January 1934		Magdeburg-Ost, Deblin-Irena	Split May 1941, part as A/B 124, part as A/B 2.
Sch/FAR 22	November 1939		Neustadt/Glewe	Closed end October 1940.
FFS A/B 23	September 1935	October 1941	Kaufbeuren	A 23 in October 1943. Closed April 1945.
FFS A/B 24	November 1939	October 1941	Parndorf, Olomouc	To Kitzingen January 1943. With A/B 121 July 1943 as FFDS A 121.
Sch/FAR 31	April 1939		Posen/Schroda	Closed June 1941. To A/B 126.
FFS A/B 32	January 1934	October 1941	Pardubitz	A 32 from October 1943. Absorbed by A 9 January 1944.
FFS A/B 33	December 1938		Ingolstadt	To A/B 123 March 1941.
FFS A/B 33	March 1941	October 1941	Ingolstadt	Part of A/B 5 until October 1941, then to Altenburg. Became BFS 10 at Quakenbrück, May 1943.
FFS A/B 41	January 1934	October 1941	Frankfurt/Oder	A 41 from October 1943. Closed February 1945
Sch/FAR 42	October 1935		Salzwedel, Prenzlau	To A/B 120 November 1940.
A/B 42	November 1940	October 1941	Neustadt-Glewe,	Re-formed as Sch/FAR 42. Langensalza October 1943, became A 42 Helmstedt. Closed January 1945.

School	First Formed	As A/B School	Main Bases	Comments
FFS A/B 43	August 1937	October 1941	Crailsheim, Prossnitz, Deiningen, Nellingen, Magdeburg.	From November 1943 with A/B 124 as FFDS A 43. Closed April 1945.
FFS A/B 51	1935	October 1941	Weimar-Nohra, Heiligenbeil	December 1941 to Elbing. March 1943 became FFS C1.
Sch/FAR 52	August 1935		Halberstadt, Jüterbog	August 1940 to A/B 119.
A/B 52	September 1940	October 1941	Danzig-Langfuhr	A 52 from October 1943. January 1945 to Celle. Closed March 1945.
Sch/FAR 53	April 1939		Straubing, Gutenfeld	November 1939 merged with A/B 5. To A/B 122 March 1941.
FFS A/B 61	January 1936	October 1941	Oschatz, Werder/Havel	From October 1943 as A 61. Closed March 1945.
FFS A/B 62	1936	October 1941	Quedlinburg, Bad Vöslau	Closed July 1943. Some personnel to JG 300.
FFS A/B 63	November 1939	October 1941	Marienbad, Eger	Absorbed A/B 8 October 1940. Closed July 1942.
FFS A/B 71	January 1934	October 1941	Kõnigsberg, Guben	December 1943 with FFS A/B 12 to Breslau, Prossnitz to form FFDS A12.
FFS A/B 72	January 1936	October 1941	Detmold, Fels am 1944	Became A 72 October 1943 at Wagram. To Schwerin Markersdorf. Closed March 1945.
FFS A/B 82	1936	October 1941	Quakenbrück, Cottbus, Pretzsch	Closed July 1942.
FFS A/B 110	December 1939	January 1940	Stubendorf	July 1943 became BFS 11.
FFS A/B 111	December 1939	January 1940	Oels, Roth	Closed February 1942.
FFS A/B 112	November 1939	January 1940	Tulln, Ingolstadt, Böblingen, Nellingen	With LKS 7. October 1941 to Böblingen. October 1943 became A12.
FFS A 112	October 1943		Nellingen	Closed December 1944.
FFS A/B 113	March 1940	March 1940	Brünn	September 1943 joined to A/B 3 to form FFDS A 3.
FFS A/B 114	January 1940	January 1940	Zwölfaxing-Wien,	To October 1943 as A 114. Closed April 1945. Weimar-Nohra August 1943.
FFS A/B 115	Late 1939	January 1940	Wels	Closed as A 115 in March 1945. Personnel as ground troops in Graz.
FFS A/B 116	Late 1939	January 1940	Neudorf-Oppeln, Göppingen, Werder.	As FFDS A 116 October 1943. As A 116 December 1944. Closed April 1945.
FFS A/B 117	March 1940	March 1940	Kamenz, Bad Aibling	September 1941 joined with *Stuka-vorschule* Bad Aibling.
FFS A/B 118	January 1941	January 1941	Stettin-Altdamm, Braunschweig.	As A 118 from October 1943. Closed March 1945.
FFS A/B 119	August 1940	August 1940	Jüterbog-Damm, Kassel-Rothwesten	To Kassel, l May 1941. Closed April 1945.
FFS A/B 120	November 1940	November 1940	Prenzlau	May 1942 merged with FFS A/B 2 in France. CO until close was WWI ace von Beaulieu-Marconnay.
FFS A/B 121	July 1940	July 1940	Straubing	July 1943 joined by A/B 24 to form FFDS A 121. End January 1945 to LKS 11.
FFS A/B 122	March 1941	March 1941	Gutenfeld, Jena	Closed July 1942.
FFS A/B 123	March 1941	March 1941	Elbing, Agram (Zagreb), Graz-Thalerhof	Trained Croatians. May 1943 moved to Graz as A 123. Closed January 1945.
FFS A/B 124	June 1941	June 1941	Diedenhofen, Metz-Frescaty	November 1941 to Metz. FFDS A 43 from November 1943.
FFS A/B 125	January 1941	January 1941	Neukuhren, Elbing, Fassberg, Prowehren, Magdeburg	August 1943 absorbed A/B 11as FFDS A/B 125. October 1943 as FFDS A 125 from December 1944. Closed March 1945.
FFS A/B 126	June 1941	June 1941	Gotha	From Sch/FAR 31. Closed June 1942.
FFS *(See)* 1	May 1935	January 1940	Warnemünde, Parow	Closed December 1940.
FFS *(See)* 2	April 1936	January 1940	Pütnitz	Renamed FFS (C) 17 in January 1941 as a land-based unit.
FFS *(See)* 3	April 1936	January 1940	Stettin	Founded as DVS Stettin. January 1941 absorbed by A/B 118.

The Machines

At the time of the declaration of the existence of the *Luftwaffe* in 1935, the training aircraft in use ranged from single-seat gliders to heavy aircraft weighing over 2,500 kg. These were classified with Germanic thoroughness into different groups which corresponded to the different pilot certificates. With but a few notable exceptions the civilian registrations carried by these land-based aircraft served to identify the class, as shown below.

Table 2: **German Civilian Aircraft Classifications and Registrations**

Class	Personnel	All-up Weight	Engines	Registration Group
A1	1-2	Up to 500 kg	1	D-YAAA to D-YZZZ
A2	1-3	Up to 1,000 kg	1	D-EAAA to D-EZZZ
B1	1-3	Up to 2,500 kg	1	D-IAAA to D-IZZZ
B2	4-6	Up to 2,500 kg	1	D-OAAA to D-OZZZ
C1	over 6	Over 2,500 kg	1	D-UAAA to D-UZZZ
C2	over 6	Over 2,500 kg	2+	D-AAAA to D-AZZZ

Classifications for marine aircraft were similar except for weight differences as below:

Class	Personnel	All-up Weight	Engines	Registration Group
A1	1-2	Up to 600 kg	1	D-YAAA to D-YZZZ
A2	1-3	Up to 2,200 kg	1	D-EAAA to D-EZZZ
B	1-4	Up to 5,000 kg	1	D-IAAA to D-IZZZ
C	over 6	Over 5,500 kg	2+	D-AAAA to D-AZZZ

As previously noted, there were a few well-chosen anomalies within the system. With the Nazis' well-developed taste for subterfuge, those aircraft carrying registrations beginning D-I were supposedly 'experimental'. In reality these were most often military aircraft, and frequently not even seaplanes. An example is a Heinkel He 45, registered D-ISES, which was in service as a reconnaissance aircraft with *Aufklärungsgruppe* 24 based at Kassel-Rothwesten during 1935.

With the development of more sophisticated and inevitably heavier machines, the classifications were changed several times during the war. By 1944 they looked like Table 3:

Table 3: **German Aircraft Classifications 1944**

Class	Code	Personnel	Land-based	Marine types
A1	D-Y	1-2	Up to 500 kg	Up to 600 kg
A2	D-E	1-3	500 to 1,000 kg	600 to 2,200 kg
B1	D-I	1-4	1,000 to 2,000 kg	2,200 to 5,500 kg
B2	D-O	4-6	2,500 to 5,000 kg	2,200 to 5,500 kg
C-1	D-U	over 6	Over 5,000 kg	Over 5,500 kg
C-2	D-A	over 6	Over 5,000 kg	

By the summer of 1939, the OKL (High Command of the *Luftwaffe*) and the RLM (Air Ministry) had agreed upon a basic establishment of aircraft for the A/B schools. In theory each A2 school was to have 45 aircraft, B1 schools to have 21 and the B2 schools to have 30. Logically, one would assume that this would have been accompanied by a rationalisation of the numerous different types of trainers then in use with consequent advantages in production and maintenance. Rationalisation would have also made it easier to regulate standards of training. Nevertheless, in a manner typical of the neglect attending the training services, the question of rationalisation was not seriously addressed until October 1944 – far too late to be any more than an academic exercise.

The overwhelming need for the German aircraft industry to produce combat aircraft meant that production of new trainer aircraft was slow, in many cases taking place in occupied countries, primarily Czechoslovakia and France. Apart from the sometimes dubious quality of the final product, with liberation these production centres were lost, creating yet more pressure upon the training system. In most cases training schools were forced to function with a bewildering variety of machines, including captured enemy aircraft, in a bid to stay operational. An indication of the diversity of machines in use for primary and basic training in the early war years is given below.

Table 4: **German Elementary and Basic Trainer Aircraft Types**

A2 Land: Bü 131, Bü 133, Bü 181, Fw 44, He 72, Kl 25, Kl 35
B1 Land: Ar 65, Ar 66, Ar 68, Ar 76, Ar 96, Fw 56, Go 145, He 45, He 46, He 51, Bf 108
B1 Sea: He 42W, He 60W, He 114
B2 Land: Fw 58, He 70, Ju F13
B2 Sea: Ju W33 W, Ju W34 W

In addition, odd examples of obsolete types such as the Albatros L101 survived to carry the swastika. Later still in the war the need for specialist trainer versions of combat aircraft was belatedly recognised and this led to production of two-seat versions of the Focke-Wulf Fw 190, Messerschmitt Bf 109 and Messerschmitt Me 262.

Apart from the German-produced types there were many captured aircraft to be seen on *Luftwaffe* airfields. Prominent among these were Czech Praga and Avia machines. Numerous examples of the US-built North American NA 57, (the fixed undercarriage version of the Texan), which had been in service with the *Armée de l'Air* in France, were also used. In addition, many French fighters were utilised as advanced trainers, particularly the Dewoitine D 520. Generally speaking, any reasonable captured enemy aircraft could find itself in the *Luftwaffe* training inventory, even some Soviet-designed machines such as the Tupolev SB-2 (FFS (C)2 being one known user) and Yakovlev UT-2 were found useful employment. A good example of the range of exotic types used by the *Luftwaffe* can be found in an RLM order dated 16 March 1943 which listed types from eight countries apart from Germany to be scrapped or withdrawn from service. These included a number of ex-civilian models, some in service in extremely limited numbers. See Table 5 (*below*).

It is not possible to list every aircraft type ever used in the A/B schools here, but brief descriptions of all the major machines designed for primary and basic training follow, roughly in the order in which a student might encounter them. Data refers to the main production versions.

Table 5: **Aircraft types to be withdrawn from Luftwaffe service 16/3/1943**

Czech:
Zlin XII
Zlin 212
Benes-Mràz Be 51
Aero 100

British:
Airspeed Envoy
Puss Moth
Tiger Moth
Moth Major
Leopard Moth
Gloster Gladiator
Vega Gull

French:
Morane-Saulnier MS 230
Caudron 635

Dutch:
Fokker G 1

Italian:
Caproni Ca 135
RWD 8

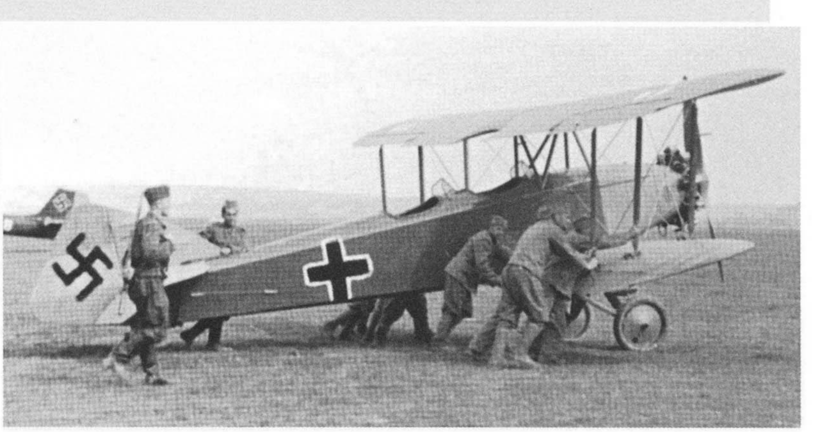
Polish:
PWS 26

Belgian:
Tipsy B

German types also to be withdrawn:

Bücker Bü 180
Bücker Bü 182
Blohm & Voss Bv 141
Junkers Ju 46

Arado Ar 95
Arado Ar 195
Arado Ar 231
Dornier Do 17 J, R, S, V



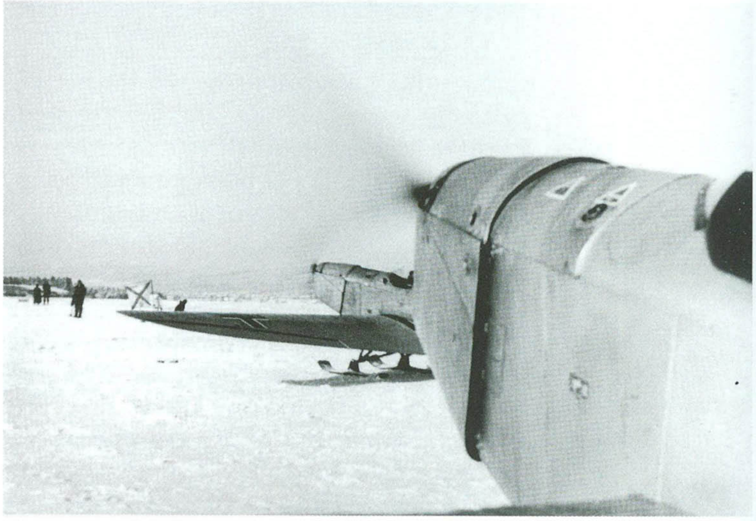
BELOW: This photograph shows just one example of the many aircraft of foreign manufacture that was seconded into Luftwaffe service. It shows a Yugoslavian Fizir F.N. trainer and was taken in May 1941 in Semlin near Belgrade. The aircraft has been crudely painted with the German national markings. The Yugoslav personnel are being observed by a Luftwaffe armed guard. Note the tail of a Ju 87 in the background carrying the standard yellow rudder marking often used on Luftwaffe aircraft operating in the Balkans.

Klemm L 25

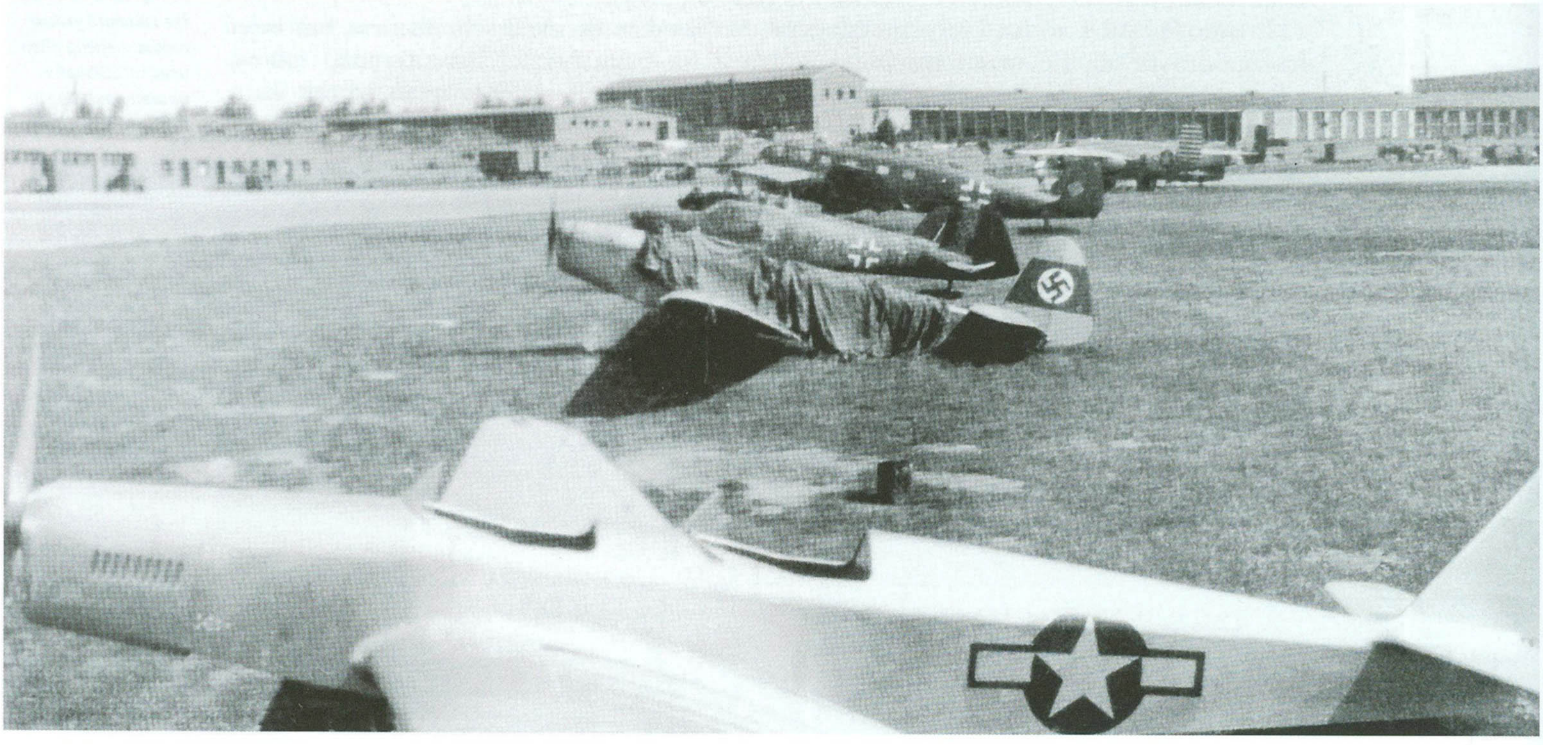
A small two-seater open cockpit monoplane produced by Klemm Leichtflugzeugbau GmbH at Böblingen. Of rugged all-wood construction, with a fixed spatted undercarriage, the first examples flew in 1928 powered by 20 hp Mercedes engines. Later versions used a variety of engines, both in-line and radial, of progressively greater power. Fifteen were exported to Britain before the war where they used several different British engines, including the 75 hp Pobjoy R. Another 28 were built under licence in Britain by the British Klemm Aeroplane Co. as the B.A. Swallow. Some 600 were built in Germany between 1929-1935 and saw service with all the different Nazi paramilitary flying training organisations such as the DVS, DLV, NSFK and *Luftdienst* as well as the *Luftwaffe*. Used on float and ski undercarriages as well as wheels, they were not particularly aerobatic; their 13 m wingspan gave them admirable gliding characteristics which, however, made them prone to 'float' on landing, to the discomfiture of many a student pilot. At least one, D-ENAA, survived until the end of the war to be captured at Stuttgart-Echterdingen by the American 324th Fighter Group, still in its original pre-war silver finish.

Specification

Span:	13.00 m (42 ft 7$^{3}/_{4}$ in)
Length:	7.50 m (24 ft 7$^{1}/_{4}$ in) (L 25d VIIR with Hirth HM 60 R engine)
Loaded weight:	720 kg (1,587 lb)
Max speed:	160 km/h (100 mph)



RIGHT: Snow did not hold up training. Close view of the forward fuselage of a Klemm L25 with another on skis taking off in the background. Large numbers of these Klemm trainers saw service with FFS A/B 8, flying from the field at Marienbad during winter 1940 – code letters for at least seventeen are known. The cross flag marks the assembly point for waiting students. (AMC)



A line-up of captured German communication and liaison aircraft captured by American forces and gathered together on Stuttgart-Echterdingen airfield just after the end of hostilities. Nearest the camera, already in full USAAF silver finish and markings, is what appears to be a pre-war Czech Zlinn XII, modified to have open cockpits and a Walter engine, possibly by the Americans. Next is a Klemm L25, probably D-ENAA, still in pre-war silver finish, which has miraculously survived until 1945. Behind the Klemm is a Bücker Bü 181, coded KH+UE. Lurking behind the Bücker is a Heinkel He 72, and right at the rear is a Siebel Si 204.

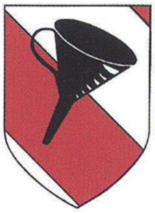
Klemm Kl 35

Probably the most important product of the Klemm company, the Kl 35 was a rather more elegant gull-winged younger brother to the L 25. Designed for the private owner, like the rest of the Klemm stable, the fixed undercarriage Kl 35 first flew in 1935 powered by a Hirth HM 60 R in-line engine of 80 hp. Built both with and without enclosed cockpits, the Kl 35 was constructed from wood with a combination wood and fabric covering; substantial numbers were produced as the Kl 35 A and Kl 35 AW floatplane with the Hirth 60 R engine. With the 105 hp Hirth HM 504 A engine it was known as the Kl 35 B and Kl 35 BW floatplane. Three of the landplane models served with the pre-war Lithuanian National Guard (*Sualiu Sajungos Aviacija*).

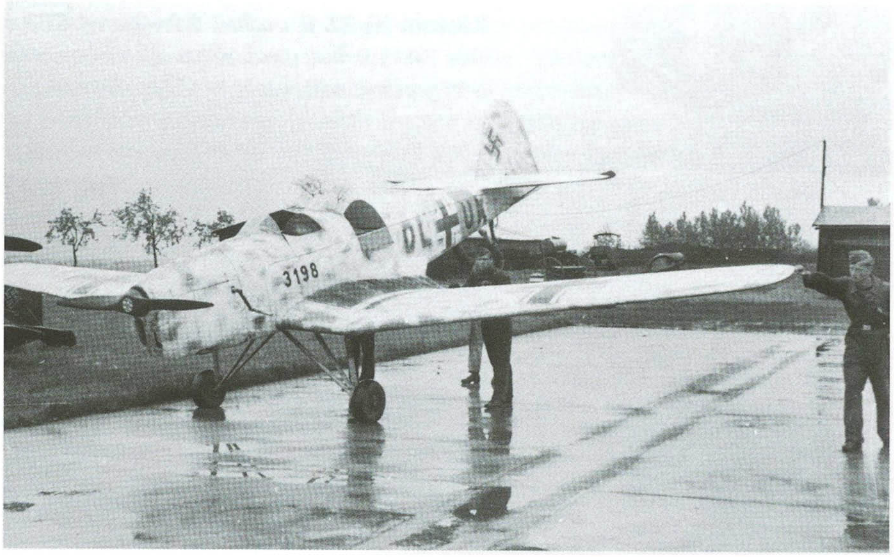
In 1938 the Kl 35 D flew, powered by a 105 hp Hirth HM 504 A-2 engine and with a strengthened undercarriage which could also be fitted with skis or floats. This was destined to be the main production version, about 2,000 being built and intended from the outset for service as a *Luftwaffe* trainer, subsequently seeing considerable service throughout World War II. Several were exported to Hungary and Rumania. Twenty-five were purchased by the Slovak air force. After importing several Kl 35B and D types, the Swedes acquired a production licence in 1941-42 to build about 74 examples of the Kl 35 D for use by the *Flygvapnet*, some of which served until 1951.

Specification

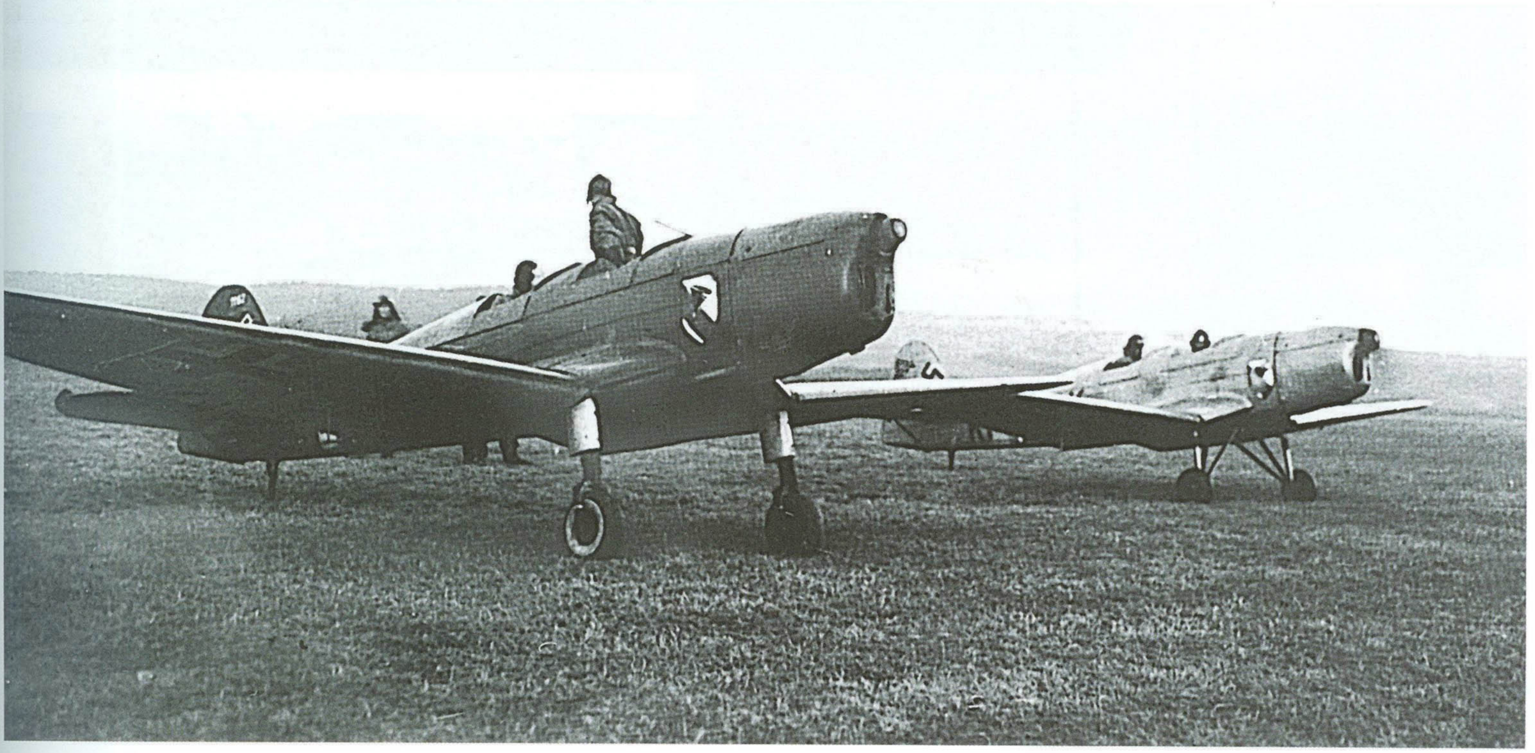
Span:	10.40 m (34 ft 1 1/2 in)
Length:	7.50 m (24 ft 7 1/4 in)
Loaded weight:	750 kg (1,653 lb)
Max speed:	210 km/h (130 mph)



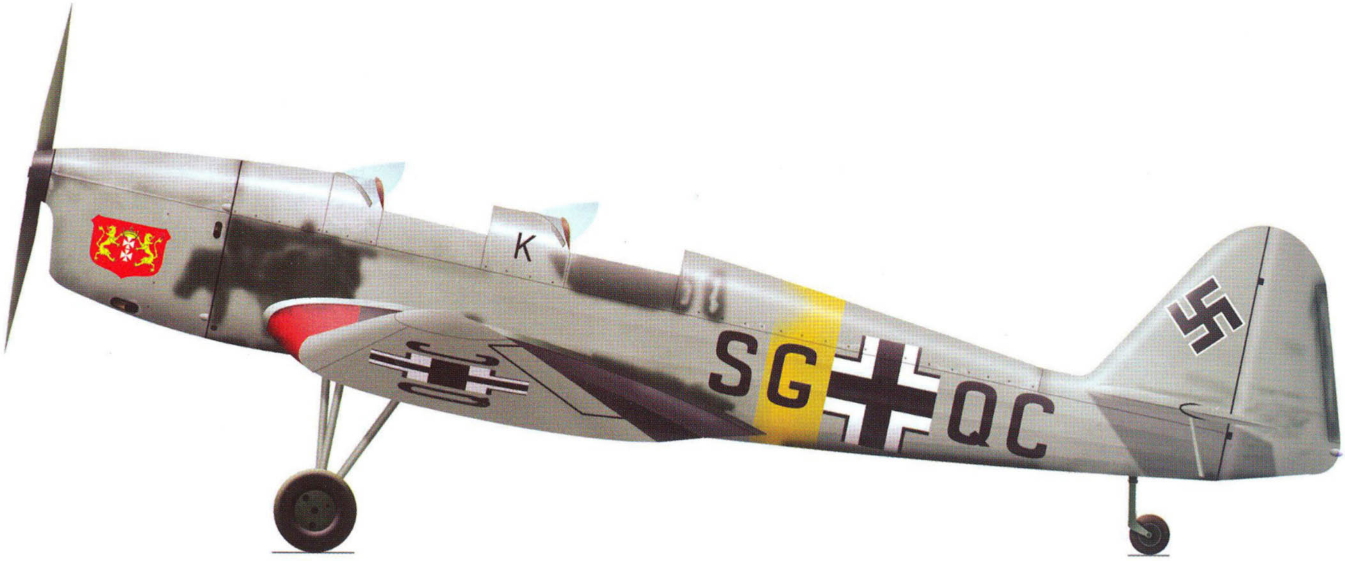
FFS A/B 4 Badge

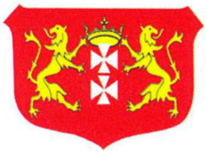


Ground crew were able to physically manhandle and push this Kl 35 D, W.Nr. 3198 coded DL+UK to the take-off point. This machine has been heavily over-sprayed with white paint. The yellow fuselage band and code have been roughly painted around leaving soft edges.



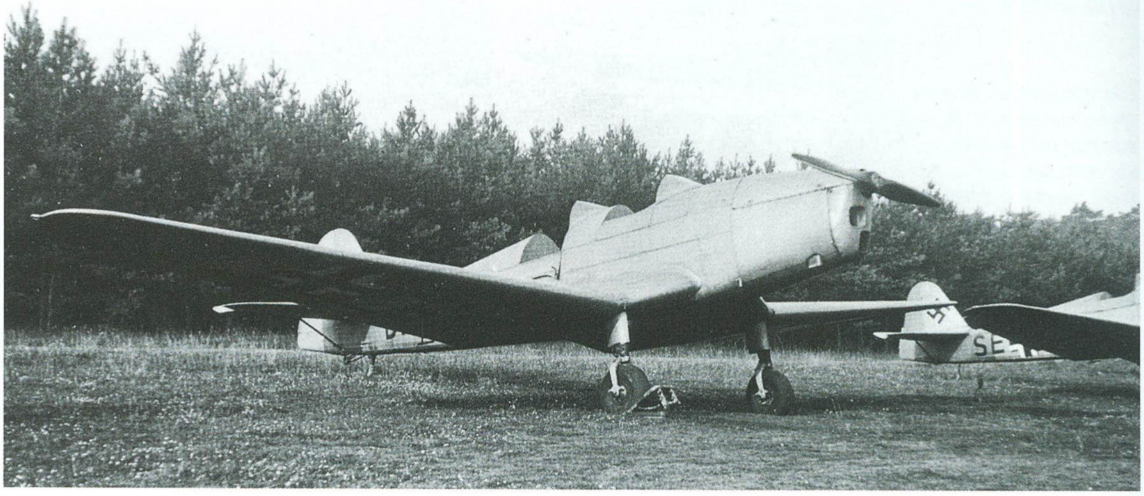
Two Klemm 35s of FFS A/B 4 display the two main camouflage schemes and the two types of undercarriage found on the type. Oddly, the nearer machine in the later dark green camouflage is an earlier Kl 35 B model, while the grey version to the rear is a Kl 35 D with reinforced undercarriage built specifically for Luftwaffe use. Date is unknown, but probably in 1942 at Neudorf-Oppeln.



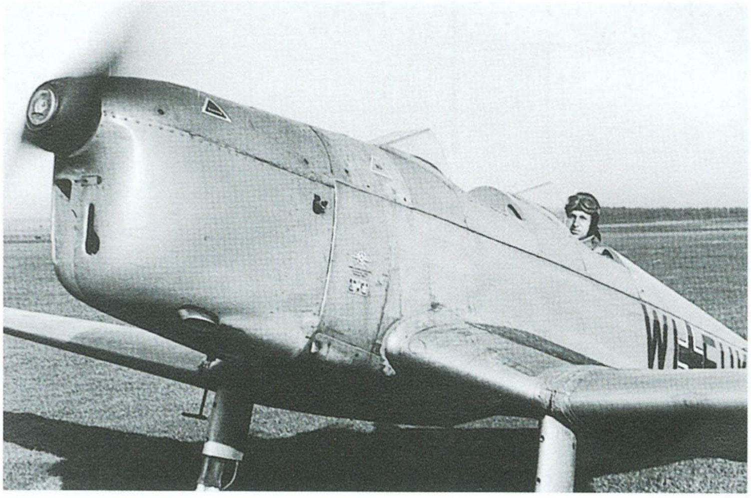


FFS A/B 52 Badge

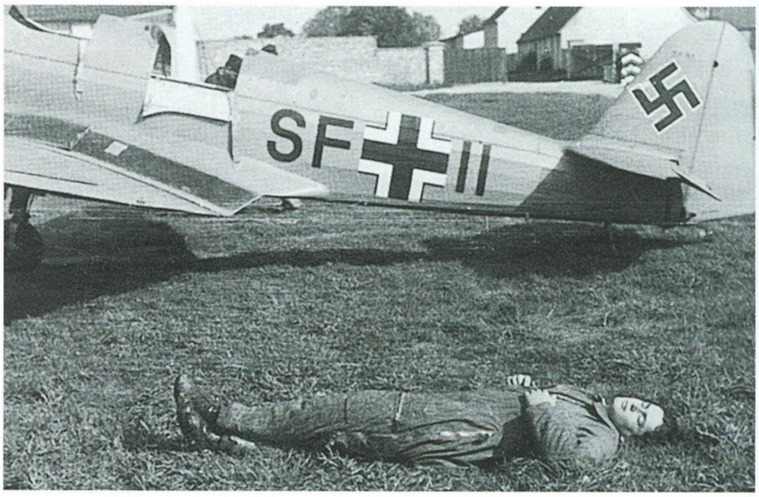
Klemm Kl 35 B coded SG+QC of FFS A/B 52, April 1942
This Kl 35 B was used as an aerobatic trainer during April 1942. It was painted overall in RLM Grey 02 with sprayed patches of RLM 66 and carried a yellow fuselage band RLM 24 in front of the Balkenkreuz.



Two Klemm Kl 35 trainers of LKS 2 await the next flight. The location is probably Güterfelde near Potsdam, sometime in 1942. The aircraft in the background appears to carry an exceptionally wide yellow fuselage band which extends out to the vertical bar of the letter 'E'.



Close-up view of the nose of a gull-winged Klemm Kl 35 trainer carrying the short-lived 'WL' code, which was officially used by Luftwaffe training aircraft for less than a year, between January to October 1939. Note how crowded the registration appears where the fuselage cross has been crammed in between the letters. The picture is believed to have been taken at Grottkau, where the aircraft was in service with A/B 9, sometime in 1940.



A pilot enjoys a nap in the sun in front of an RLM 02 Grau Klemm 35 B, SF+II. Unfortunately unit, date and location are all unknown, although the picture shows good detail of the fuselage.

Bücker Bü 131 *Jungmann*

Bücker Flugzeugbau was founded in 1932 at Berlin-Johannisthal, and quickly established itself as a major supplier of training aircraft to the embryonic *Luftwaffe*. Jointly designed by Carl Clemens Bücker and his Swedish chief design engineer, Anders Andersson, the Bücker Bü 131 was the first product from the company and flew for the first time in 1934. A neat but conventional biplane, (the last such type to be built in Germany) the Bü 131 had two open tandem cockpits and a fixed, sprung undercarriage. Construction was a combination of rugged steel tubing for the fuselage and tail covered with a mixture of metal and fabric, while the wings were fabric-covered wood. Powered by the popular Hirth HM 60 R in-line engine of 80 hp, early deliveries of the Bü 131 A went to the paramilitary DLV (*Deutsche Luftsportverband*), forerunner of the *Luftwaffe*. In 1936, the Bü 131 B, powered by the 105 hp Hirth HM 504 A-2 engine, began to enter service with the elementary flying training schools of the *Luftwaffe*. In service with virtually all the A/B schools throughout World War II, although in declining numbers as training and obsolescence took their toll, the need for aircraft to equip hastily formed night ground-attack squadrons led to quite a few *Jungmann* donning warpaint. Prominent amongst these *Nachtschlachtgruppen* were NSGr 2, formed in 1942 and NSGr 11 and 12 in Estonia and Latvia, manned by crews from those countries.

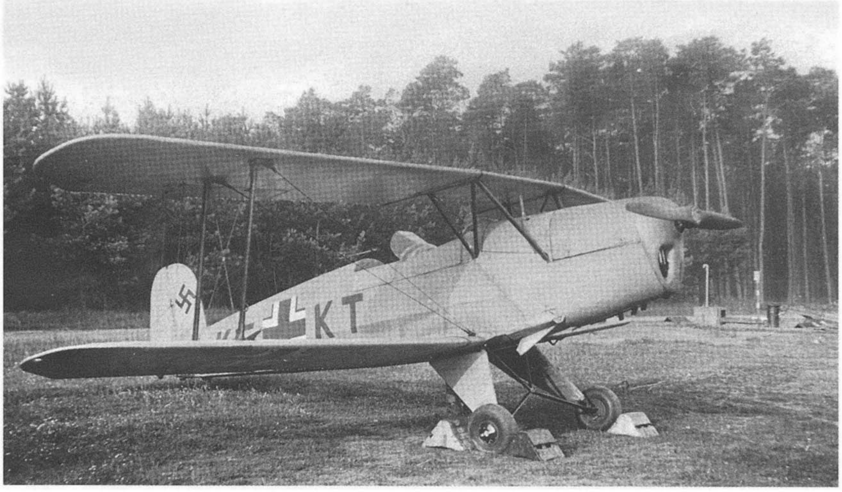
Equally successful in the primary training role in other countries, 315 examples found their way to the Air Force of Hungary, while Czechoslovakia built 10 under licence as the Tatra T 131 before the war. Most wartime versions for the *Luftwaffe* were later produced by Aero in Prague. CASA in Spain licence-built a further 530 or so, while Switzerland standardised its training on the Bü 131 and used 94, 88 of which were licence-built by Dornier. 1,037 examples with Japanese *Hatsukaze* engines were built for the Imperial Japanese Army Air Force as the Kokusai Ki 86, and a further 339 for the Imperial Japanese Navy as the Kyushu K9W1 Cypress, as their standard primary trainer.

In total, 1,910 Bü 131s were built in World War II. Many Swiss and Spanish examples still fly today, albeit with more modern engines, while in an astonishing rebirth work commenced in 1994 on twenty new-build *Jungmann* and *Jungmeister* known as the BP 131 and BP 133 by Bücker Prado SL in Spain. These used CASA jigs and some original parts.

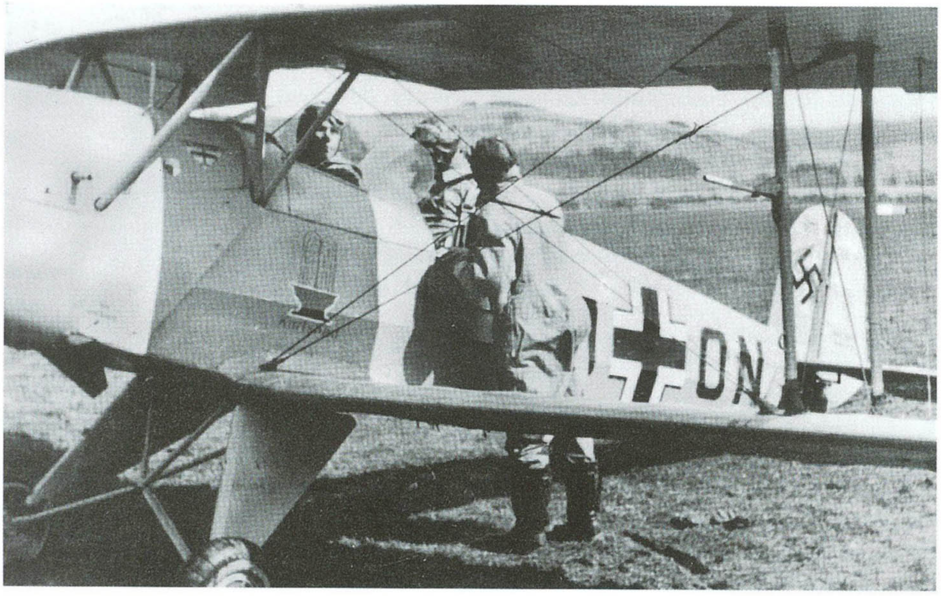
Specification

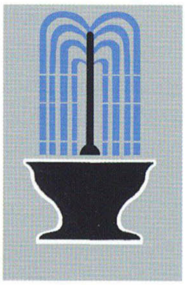
Span:	7.40 m (24 ft 3 in)
Length:	6.62 m (21 ft 8½ in)
Loaded weight:	680 kg (1,500 lb)
Max speed:	183 km/h (114 mph)

A Bücker Bü 131, one of the workhorses of the Luftwaffe primary flying training schools. In this case, KF+KT belongs to LKS 2 based at Reinsdorf near Jüterbog in 1942. (AMC)



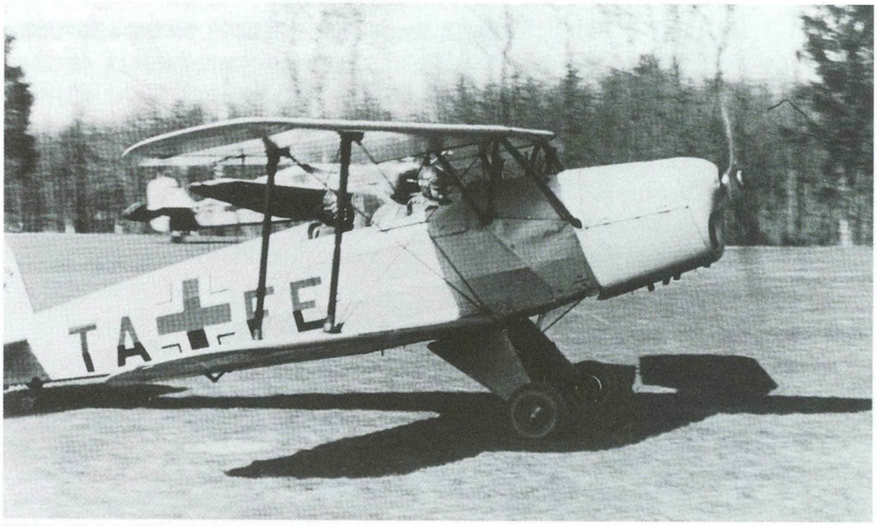
Training carried on whatever the weather. Two overall grey Bücker Bü 131 trainers warming up their engines on a snow-covered Luftwaffe training base. Both aircraft appear to carry codes beginning PE+??. Location may be in Czechoslovakia in winter 1939-40. Note that the machine on the left has the early style extended cranked engine exhaust.



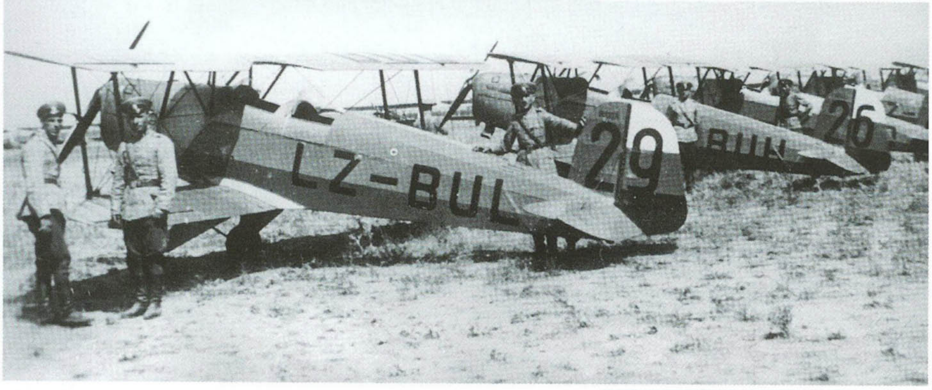


FFS A/B 63 Badge

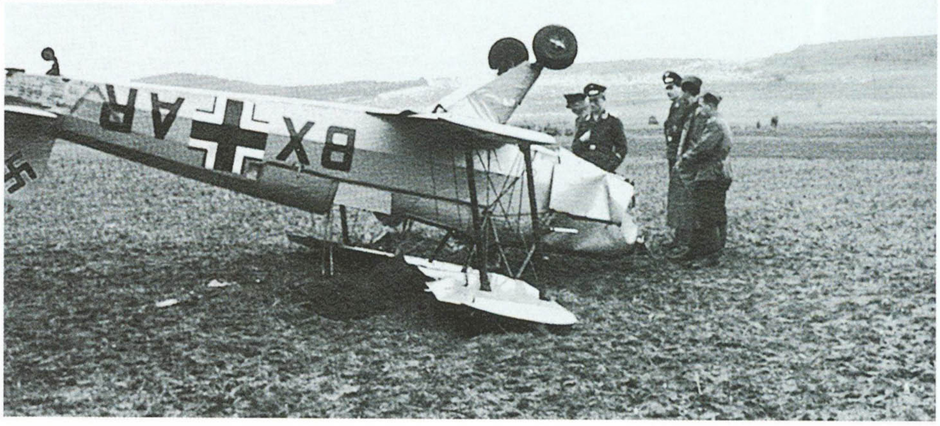
The beginning of flight training. Bücker Bü 131, GD+ON, of FFS A/B 63 (note badge just below front cockpit), Marienbad 1941. FAR 63 was established on 1 December 1938 at Eger. FFS A/B 8 was established in December 1939 in Marienbad. In February 1940, FAR 63 moved to Marienbad and took over A/B 8 in October 1940, at the same time taking the sitting tenant unit's number. Subsequently the school was renumbered FFS A/B 63 from 1 October 1941. The HQ was at Marienbad, but operations also took place at Karlsbad and Vilseck near Grafenwöhr.



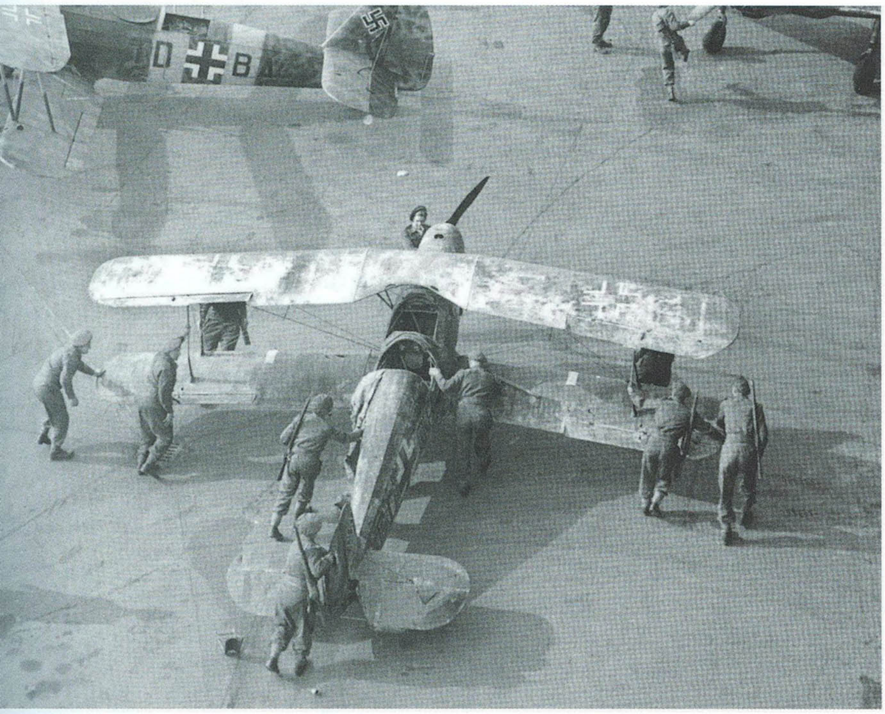
A Bü 131 D rolling out for take-off on a training flight. The instructor in the front seat has control of TA+FE, which may belong to A/B 1.

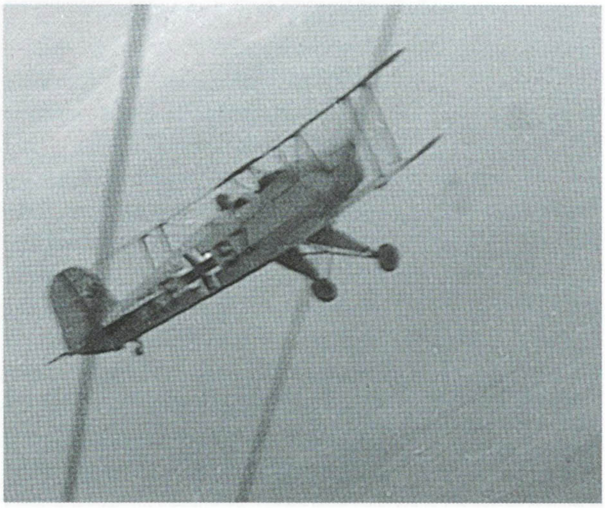


The little Bü 131 also found favour with Germany's allies. Here is a line-up of fourteen of the type delivered to Bulgaria in 1940, all wearing civilian and military markings.



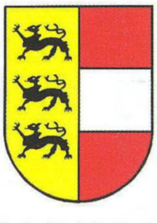
An overturned Bücker Bü 131, BX+AR, W.Nr. 420? after a forced-landing accident near Nieder-Ellgüth. Note the inscription under the tail, which gives information concerning the owners.



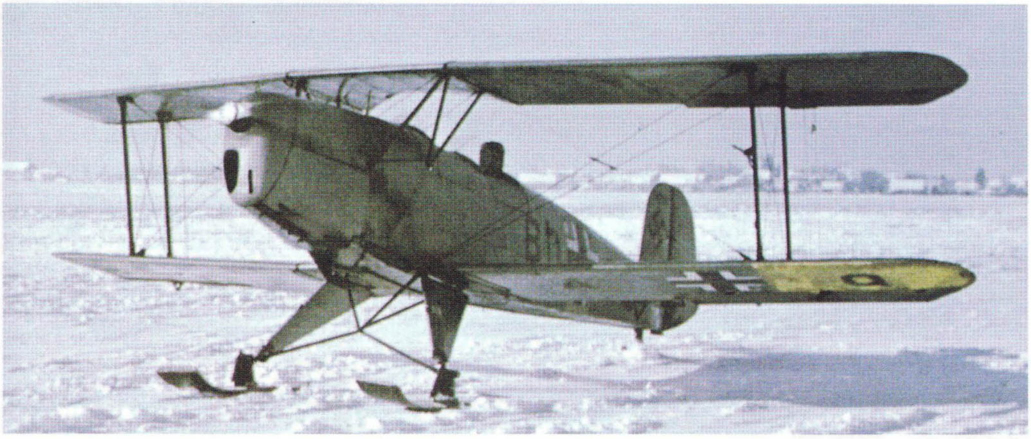


Aerobatics with a Bücker Bü 131, coded KF+SZ, belonging to A/B 32, taken from an accompanying machine, somewhere over Czechoslovakia, December 1940. The machine had a remarkably long life with this unit, having first been delivered in April 1939 and still being on strength in October 1941.

British troops manhandling a captured Bü 133mm, GD+OH, which wears the vestiges of temporary winter camouflage. Note the late-war white outline wing crosses and the earlier style on the fuselage. The unit to which this aircraft belonged is not known, although GD+OJ was based at Marienbad.



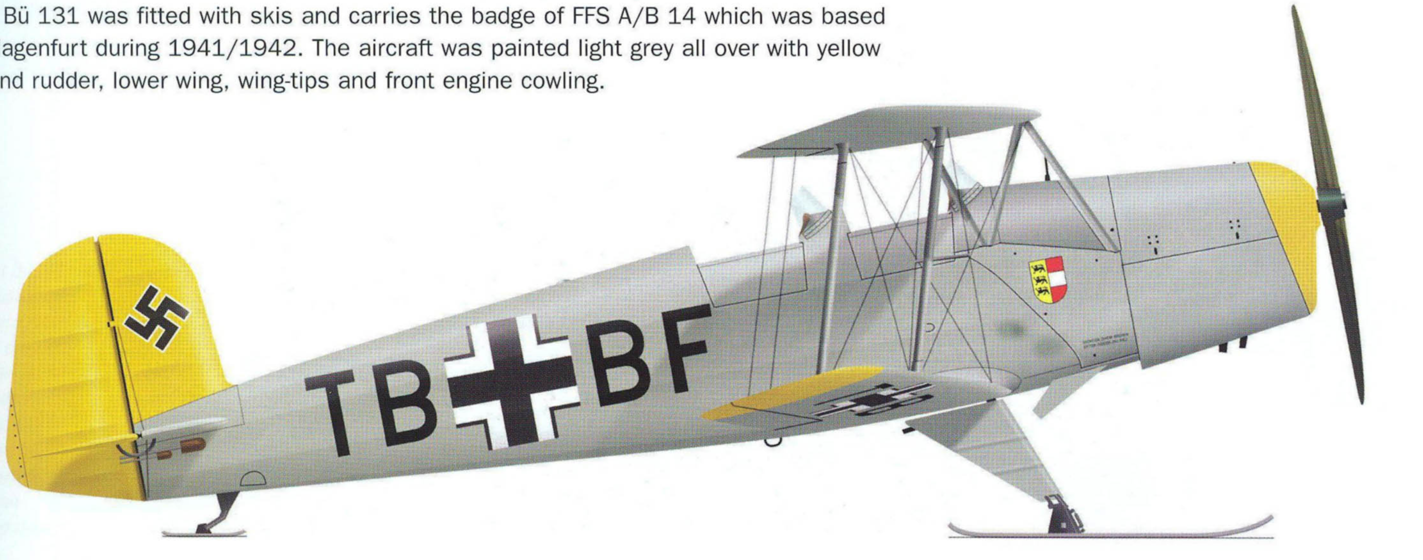
FFS A/B 14 Badge



Bücker 131 'Jungmann' coded BD+AQ, fitted with skis, photographed in Govizice in the winter of 1941/42.

Bücker 131, coded TB+BF, of FFS A/B 14, Klagenfurt, 1941-1942

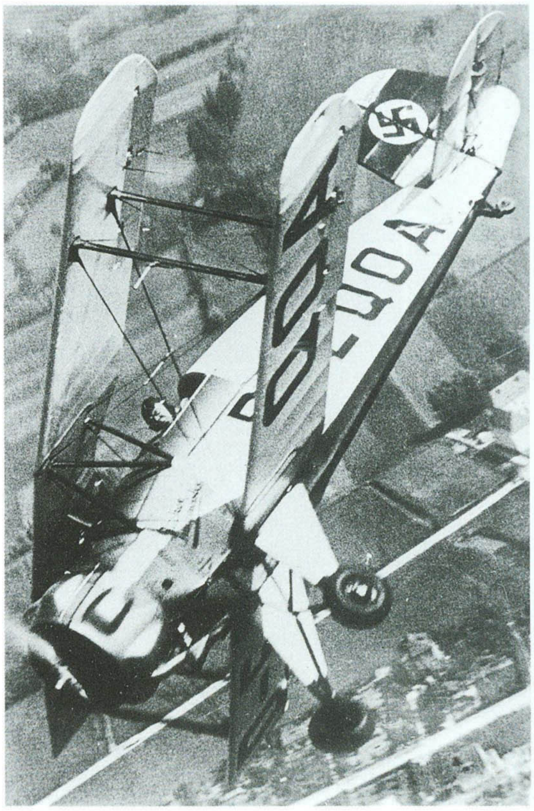
This Bü 131 was fitted with skis and carries the badge of FFS A/B 14 which was based at Klagenfurt during 1941/1942. The aircraft was painted light grey all over with yellow fin and rudder, lower wing, wing-tips and front engine cowling.



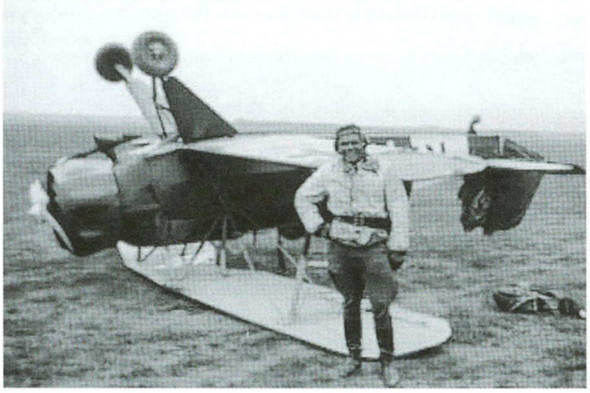
Bücker Bü 133 *Jungmeister*

The success of the company's Bü 131 naturally led to a logical development for more advanced training. The result was the Bü 133, a single-seat aerobatic and advanced trainer, which used many components from the Bü 131 but in a slightly smaller airframe. Flown for the first time in 1935 – incidentally by Germany's first woman works pilot, Luise Hoffmann – the prototype Bü 133V1, D-EVEO, was powered by a Hirth HM 506 in-line engine of 140 hp. Demonstrated publicly for the first time at the International Aerobatic Championships in Rangsdorf in 1936, the astonishing agility of the little biplane quickly attracted the attention of the leading aerobatic pilots of the day. No production of the Bü 133 A followed, and two aircraft only with 160 hp Siemens-Bramo Sh 14 A radial engines known as the Bü 133 B were built, before being superseded by the main production version, the Bü 133 C. Powered by the same engine as the previous model, but with a distinctive helmeted cowling and a 13 cm shorter fuselage, the outstanding flying qualities of the Bü 133 C soon led to a string of aerobatic championship wins. By 1938 the *Jungmeister* had become the standard aerobatic trainer of the NSFK and *Luftwaffe*. A three-man aerobatic team drawn from the *Luftwaffe* was so impressive at Brussels in 1938 that Göring ordered that a nine-aircraft team be formed. This made a tremendous impression when it appeared at the International Flying Meeting at Brussels in July 1939. Unfortunately, the *Luftwaffe's* display team was to have only a brief existence before the outbreak of war in September that year. The quality of the basic design was such that about fifty Bü 133 A and Bü 133 C machines were built under licence in Spain. A further 52 Bü 133 Cs were also licence-built by Dornier in Switzerland as the standard Swiss Air Force aerobatic trainer, where they remained in service until 1968. The *Jungmeister* was so good that it was a genuinely competitive aerobatic aircraft until well into the 1960s.

The Bü 133 C in its element. Jungmeister D-EQOA is shown being demonstrated by Rudolf Lochner over Bücker's home base at Rangsdorf in 1937. Lochner won both German and Dutch aerobatic championships in this aircraft in that year.

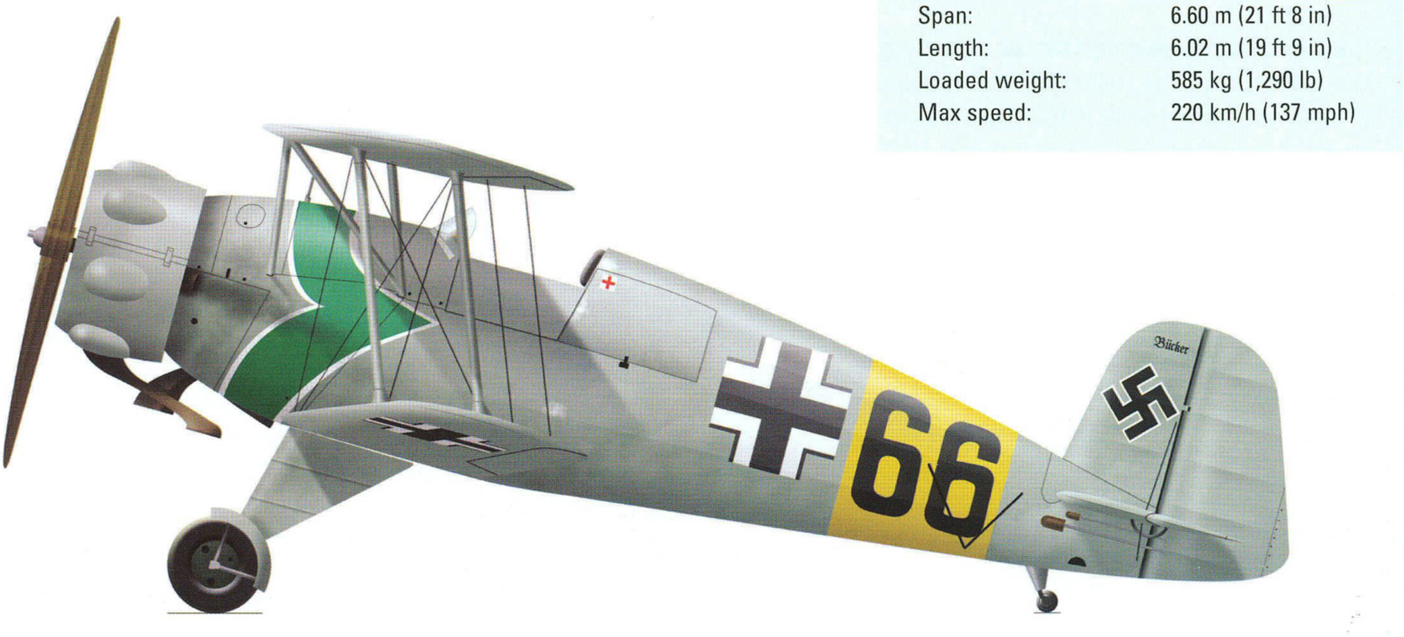


Taken from the album of 16-victory experte Gunther Loidl, this shows that the Bü 133 could still be a handful. The camouflaged aircraft is bent after this crash at Rheims in France in 1943, but the pilot, Oblt Josef Menapace, appears undamaged. Sadly he was to be killed in Russia in October.



Bücker 133, 'Black 6' of 1./JG 107

Bü 133 painted in RLM Grey 02 overall with a yellow fuselage band and distinctive green and white marking on forward fuselage.



Specification	
Span:	6.60 m (21 ft 8 in)
Length:	6.02 m (19 ft 9 in)
Loaded weight:	585 kg (1,290 lb)
Max speed:	220 km/h (137 mph)

Bücker Bü 181 *Bestmann*

The outstandingly successful biplanes produced by the company did not blind Bücker to modern developments, and the next design was a neat high-wing monoplane, the Bü 134, inspired by the American Piper Cub. The sole example, D-EQPA, flew in 1936 but did not prove to possess particularly pleasant handling. Not only this, but by then the German lightplane market was firmly enamoured with the low-wing monoplane concept. Consequently, the next design, the Bü 180 *Student,* was of this configuration. With tandem seating for two people, the Bü 180 pioneered new construction techniques for Bücker, comprising all-wooden wing structure and a steel tube, metal covered forward fuselage with a wooden monocoque aft. About 20 were built, both with and without cockpit canopies, before wartime conditions forced a halt to production.

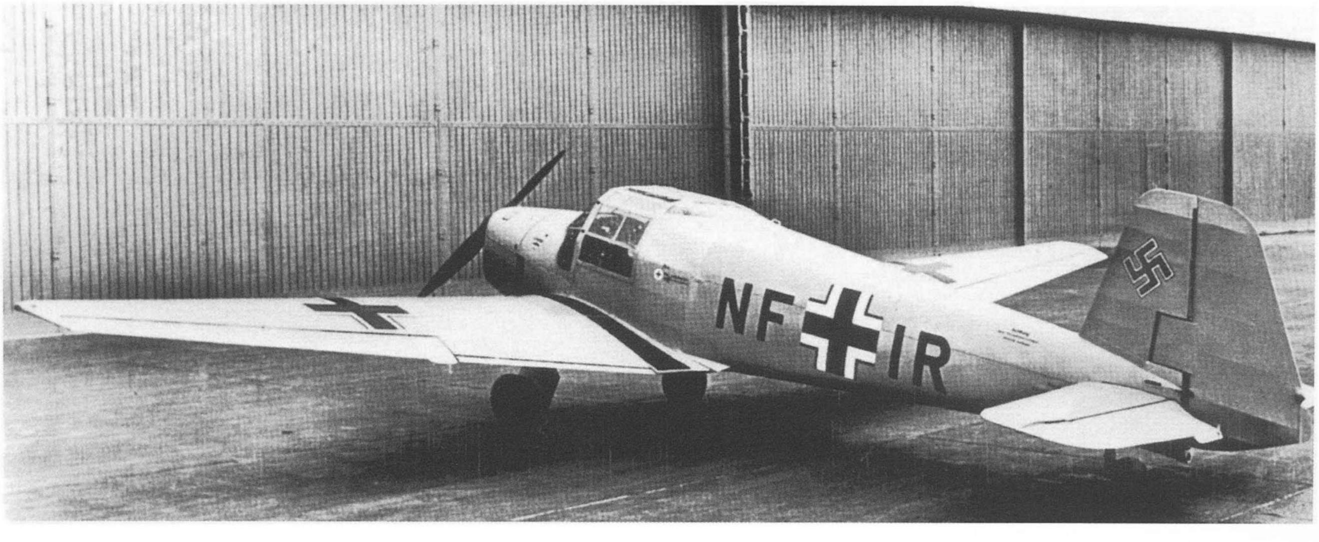
Derived from the Bü 180, the single-seat Bü 182 *Kornett*, preceded the Bü 181 into limited production. Intended for military training, the little Bü 182 flew in late 1938, but as the RLM displayed little interest only three more were completed before the design was abandoned in favour of a two-seat cabin trainer. Built in direct response to an urgent RLM request for such an aircraft, the result was Bücker's last and most modern design, the Bü 181.

Originally designed for sports and touring use, the *Bestmann* largely replaced the earlier Bücker designs in *Luftwaffe* service. Following the same general constructional principles established by the Bü 180, the undercarriage was a sturdy fixed cantilever type with single legs. The cabin offered side-by-side seating for two with a capacious baggage compartment behind. The first prototype, D-ERBV, flew in early 1939 and the superb flying qualities displayed by the aircraft led quickly to its selection as the *Luftwaffe*'s latest (and last) primary trainer. First deliveries of the Bü 181 A, powered by a 105 hp Hirth HM 504 engine, began in late 1940. Demand for the new trainer was such that the factory in Rangsdorf was unable to cope. As a result, the Fokker Company in Holland was allocated the task. Beginning in 1942, 718 examples of the Bü 181 A and slightly modified Bü 181 D were produced there. Most aircraft served with the *Luftwaffe*, although 24 were delivered to the Hungarian Air Force from 1942 onwards. Swedish experience with the earlier Bücker types led to the licence-building of 121 examples of the Bü 181 B as the Sk 25, while the Czech Zlin factory commenced manufacture just before the end of the war. Many more were produced there post-war under the Zlin label. There were even licence-built versions of the Zlin in Egypt. Total wartime production, including some 200 from the Zlin plant, was 2,730.

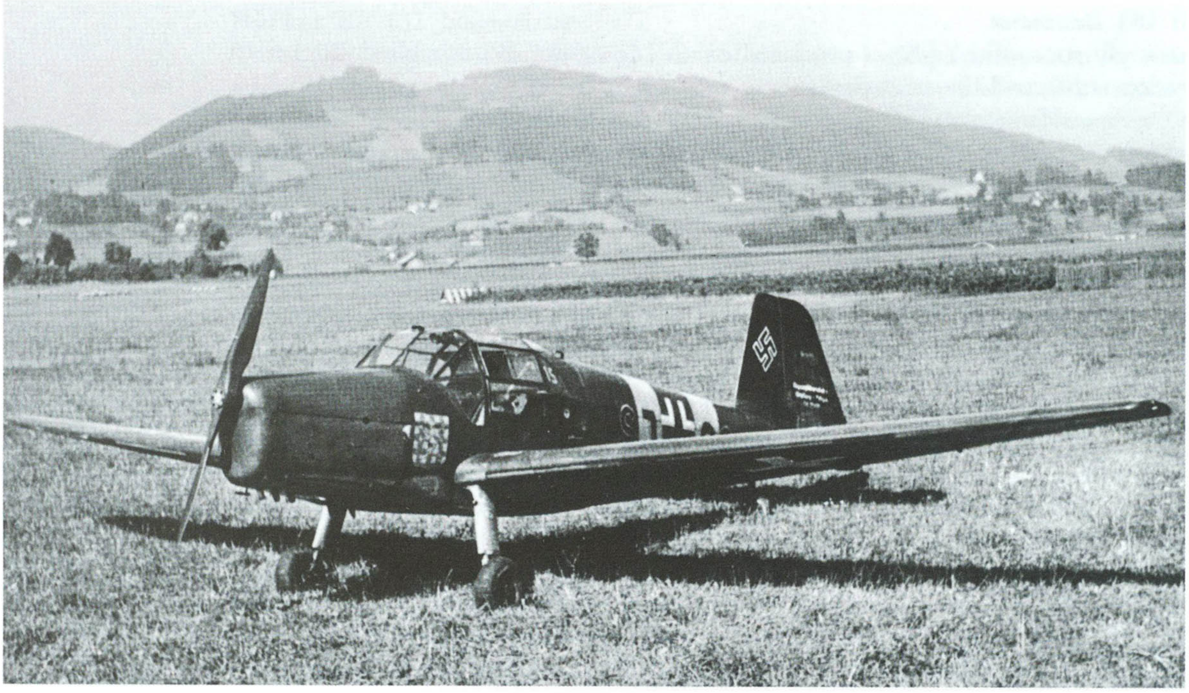
In a desperate attempt to halt the flood of Allied armour roaming across Germany in early 1945, a number of provisional anti-tank squadrons, manned by volunteers and equipped with Bü 181s jury-rigged with *Panzerfaust* anti-tank rockets under the wings, were formed. One aircraft in particular, PU+BN, had previously seen service with FFS A/B 14 in Klagenfurt. These *Panzerjagdstaffeln* saw action near Kaufbeuren, Grossenbrode, Magdeburg and Berlin. In almost every case the result was the loss of both aircraft and pilot. Several of these machines later defected to Switzerland and six subsequently served in the Swiss *Fliegertruppe* until 1956.

Specification

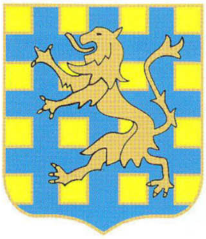
Span:	10.60 m (34 ft 9 in)
Length:	7.85 m (25 ft 9 in)
Loaded weight:	750 kg (1,650 lb)
Max speed:	215 km/h (133 mph)



A Bücker Bü 181 in a most unusual RLM 02 Grau overall finish. NF+IR is probably one of the earliest production models, as almost all versions of the Bestmann were finished with dark green uppersurfaces.

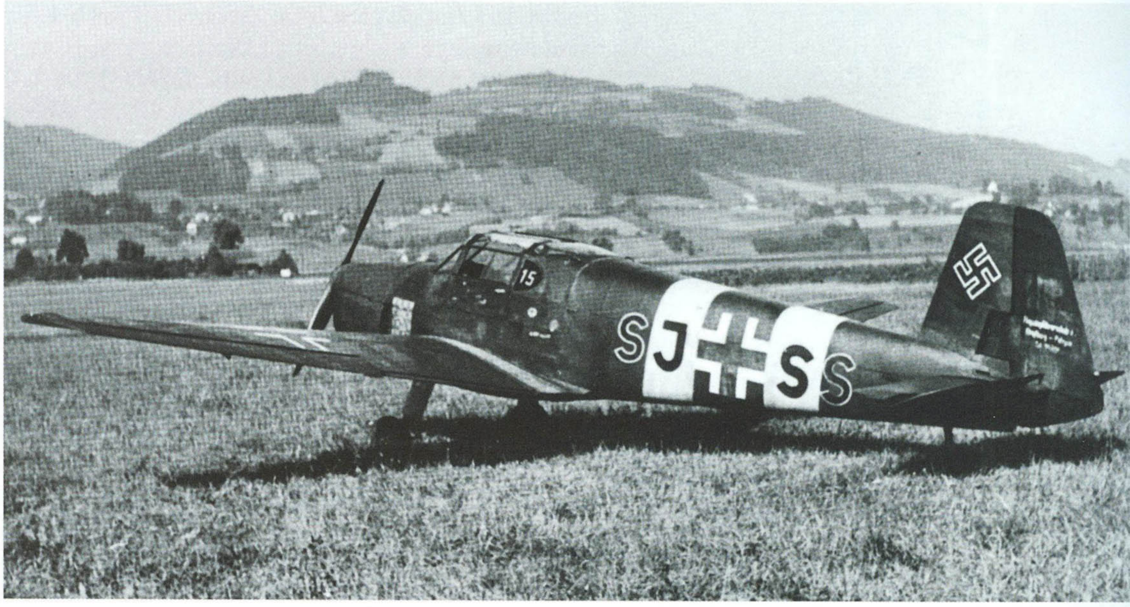


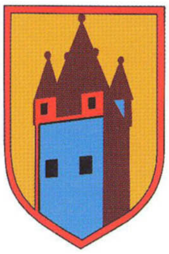
This Bü 181 B-1, W.Nr. 110273 coded SJ+SS belonging to the Flugzeugfliegerschule A/2 at Strassburg, landed on 17 August 1944 in a meadow at Benken near Basle (Switzerland). The Bestmann carried the Stammkennzeichen SJ+SS together with the unit badge painted on the engine cowling. (Hans-Heiri Stapfer)



FFS A/B 2 Badge

Unteroffizier Werner Kloschinsky defected with this Bü 181 B-1, W.Nr. 110273 to neutral Switzerland. Kloschinsky became the first German defector who fled with an aircraft to Switzerland. He was interned for the remainder of the war. The Bü 181 B-1 remained in Switzerland and subsequently saw service with the Swiss Air Force as A-251. It was struck off charge on 1 January 1956 and scrapped. (Hans-Heiri Stapfer)

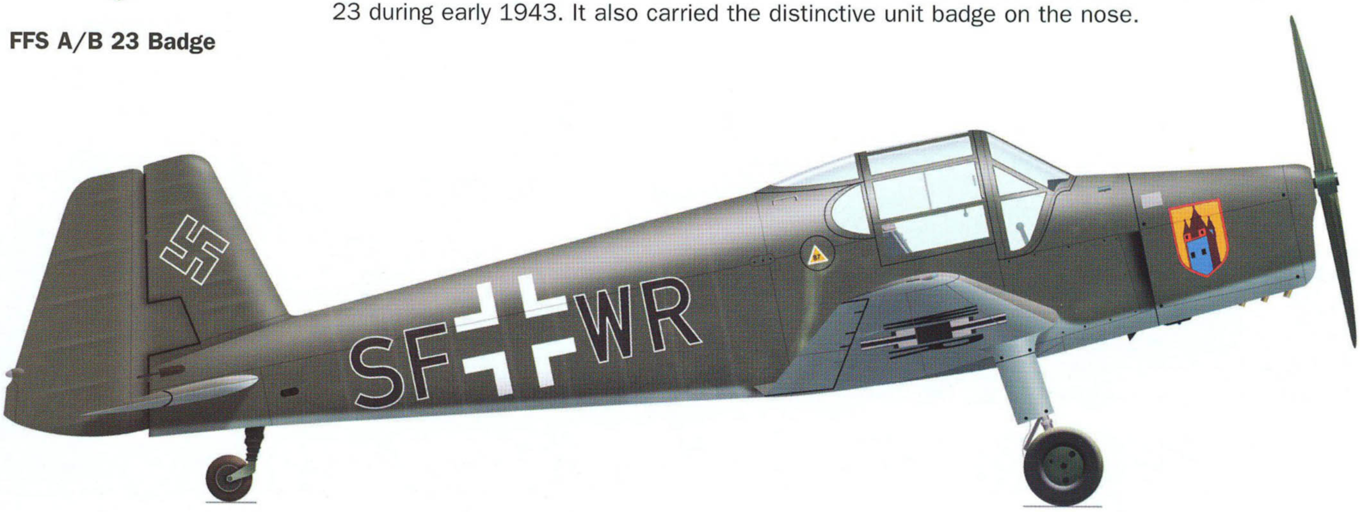




FFS A/B 23 Badge

Bücker Bü **181, coded SF+WR, of FFS A/B 23, early 1943**

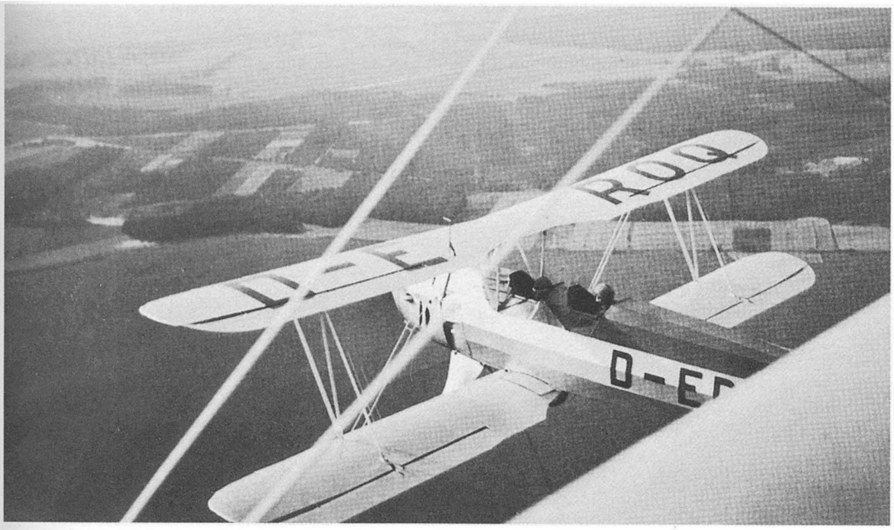
This Bü 181 was painted dark green, either RLM 70 or 71, and was operated by FFS A/B 23 during early 1943. It also carried the distinctive unit badge on the nose.



Focke-Wulf Fw 44 *Stieglitz* (Goldfinch)

Under the leadership of the legendary Kurt Tank, the first really successful aircraft from the Focke-Wulf Company flew in late summer 1932. Known as the Fw 44, a neat radial-engined biplane seating two people in tandem open cockpits, the design displayed numerous faults. Extensive testing and redesign, led by Tank, eventually eradicated these and the result was a sturdy machine with excellent flying characteristics. It was a conventional single-bay biplane constructed with a steel tube fabric-covered fuselage and wooden wings, also fabric covered, whose most distinctive visual feature was probably the large streamlined fairings to the fixed undercarriage legs. The first small production batch, known as the Fw 44 B, was powered by a 150 hp Siemens Sh 14 A radial engine, followed by the similar Fw 44 D. A small quantity was built as the Fw 44 E with the 120 hp Argus in-line engine, but the bulk of the machines built were of the military Fw 44 F type. These were powered by the reliable Siemens Sh 14 A radial engine.

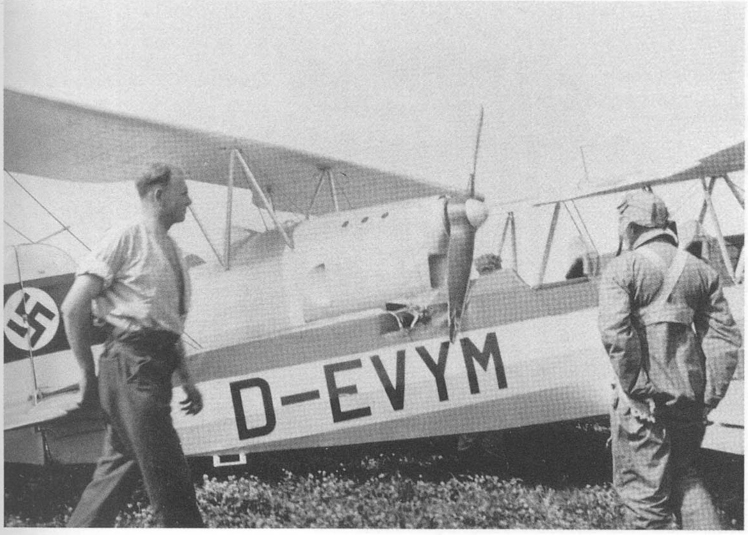
Aerobatic pilots of the calibre of Ernst Udet and Gerd Achgelis quickly helped establish a reputation for both the aircraft and the manufacturer. The result was a massive influx of orders, which established Focke-Wulf Flugzeugbau GmbH as a major aircraft manufacturer. Before the war the *Stieglitz* formed the initial equipment of many of the early DVS, DLV and *Luftwaffe* units. In service in large numbers throughout the war with many of the A/B schools, several examples survived until the 1950s. Apart from overseas buyers in Bolivia, Chile, China, Czechoslovakia, Finland, Rumania, and Switzerland, five countries produced the type under licence, namely Austria, Argentina, Bulgaria, Brazil and Sweden. In total, over 900 examples were built.



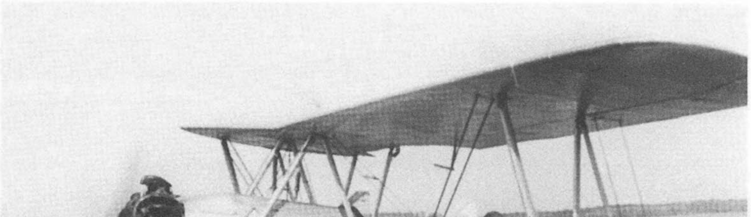
Specification

Span:	9.00 m (29 ft $6^{1}/_{4}$ in)
Length:	7.30 m (23 ft $11^{3}/_{8}$ in)
Loaded weight:	870 kg (1,919 lb)
Max speed:	185 km/h (115 mph)

LEFT: Air-to-air view of an in-line engined Fw 44 E, D-EROQ, probably in service with the DLV before the war.

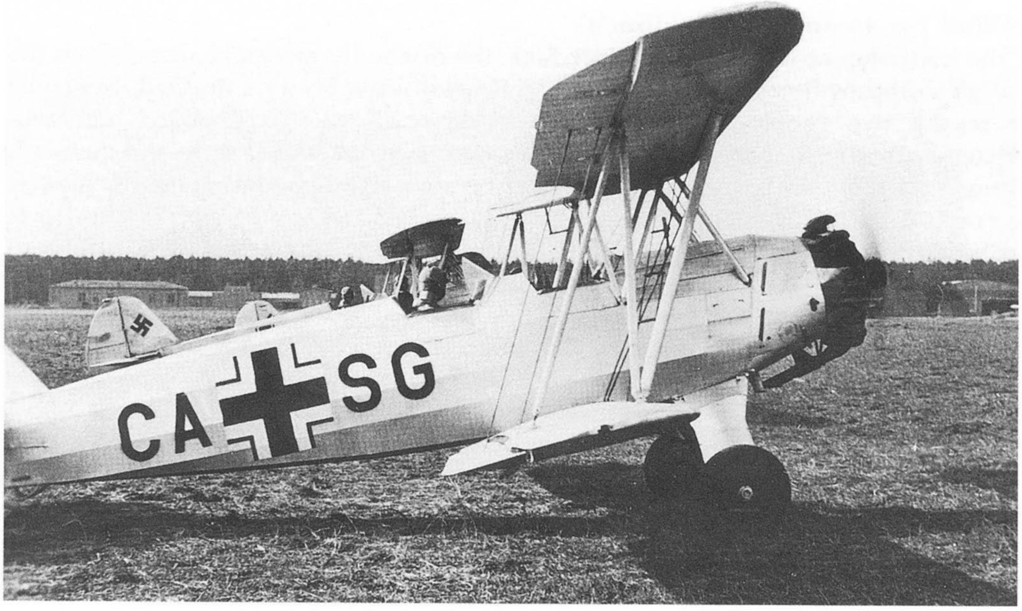


Near miss for a pilot as the He 72 A in the background tries to eat Fw 44 D-EVYM, W.Nr. 345(?), which is probably being used by the DLV. The upper decking of the fuselage appears to be painted blue or green. The exact date and location is unknown, but may be Schleißheim in 1936-37.

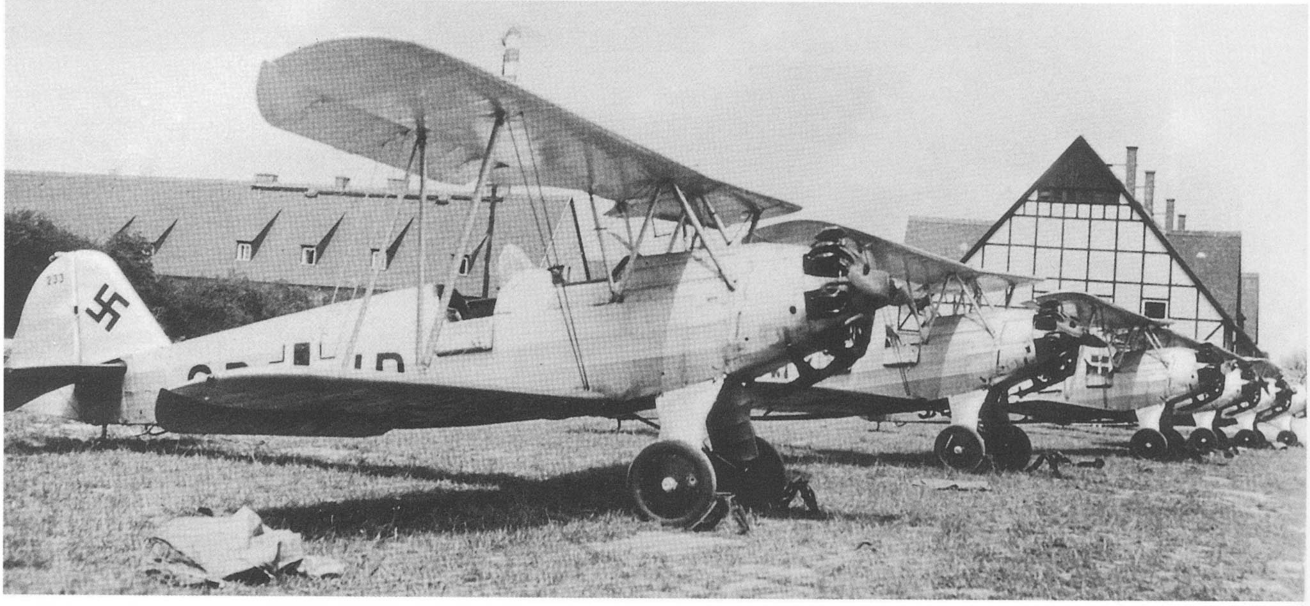


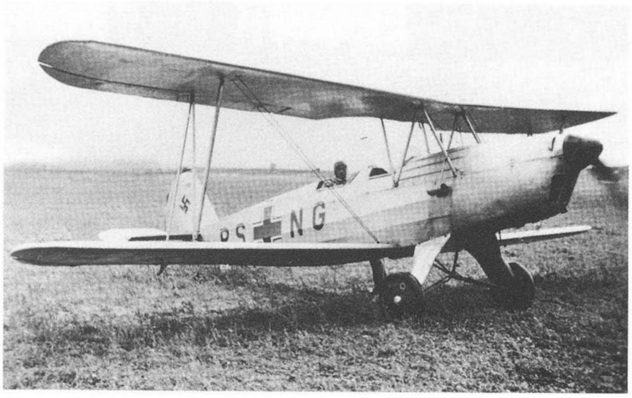
Originally registered as D-EIPQ, this Fw 44 D or J now carries the 'WL' military prefix and a Balkenkreuz where a hyphen had previously been. Apart from the fact that this probably dates the picture to sometime in 1939, nothing else is known.

A group of silver-finished Focke-Wulf Fw 44s, nearest CA+SG, about to set off for a flight from the grass airfield of Sch/FAR 13 based around Pilsen, Czechoslovakia, 1940. On 1 October 1941 this became FFS A/B 13.

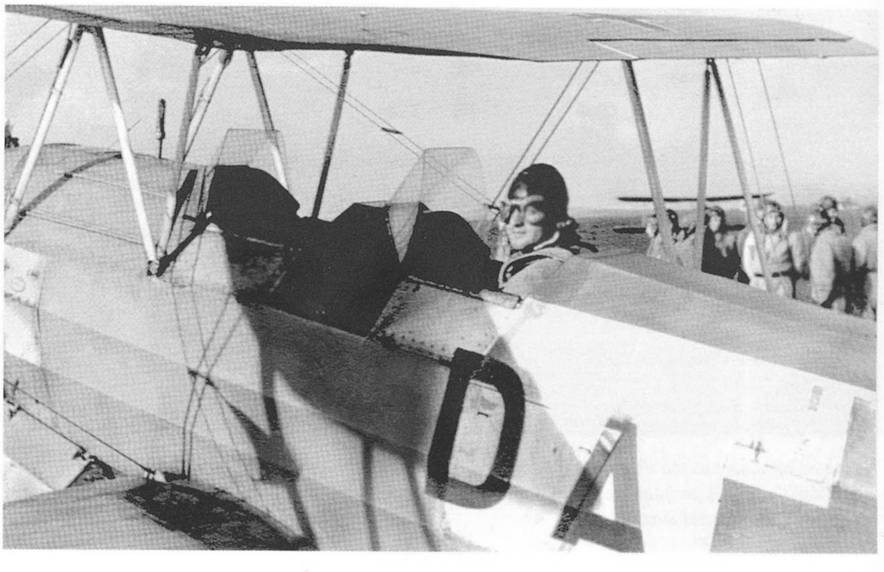


A very clear picture on an unidentified Luftwaffe base with a line-up of pristine silver Focke-Wulf Fw 44s. The nearest machine, W.Nr. 233, appears to carry a code beginning with CD. Marking style and colours suggest mid-1940 on.

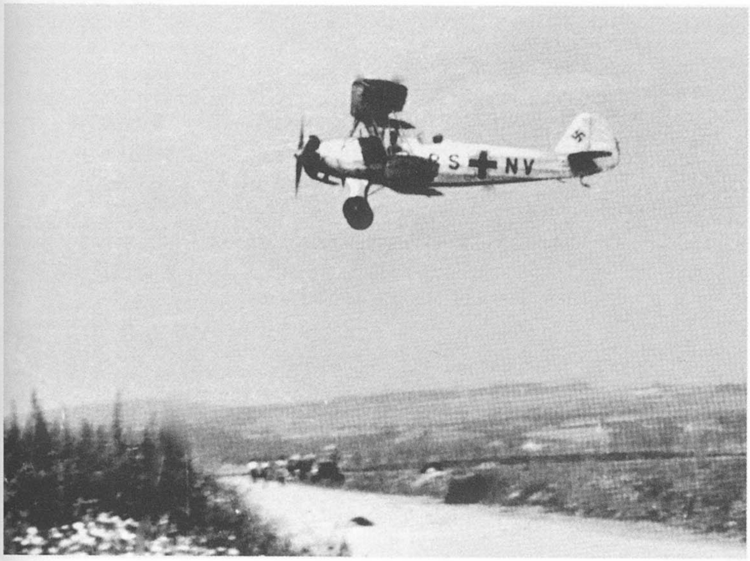




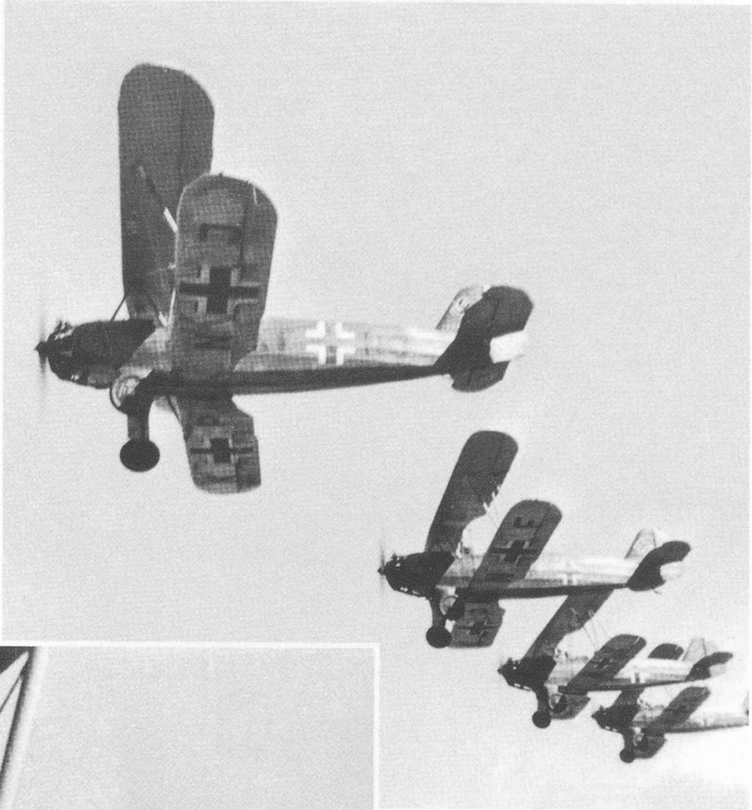
One of the rarer versions of the Focke-Wulf Fw 44 elementary trainer, the Fw 44 E, powered by an in-line Argus engine. Variants fitted with this engine were known in the Luftwaffe as the 'Zitter-Stieglitz' – Shaky Stieglitz – on account of the vibration. PS+NG, (possibly W.Nr. 376), was serving with FFS A/B 13 based around Pilsen, Czechoslovakia, 1940.



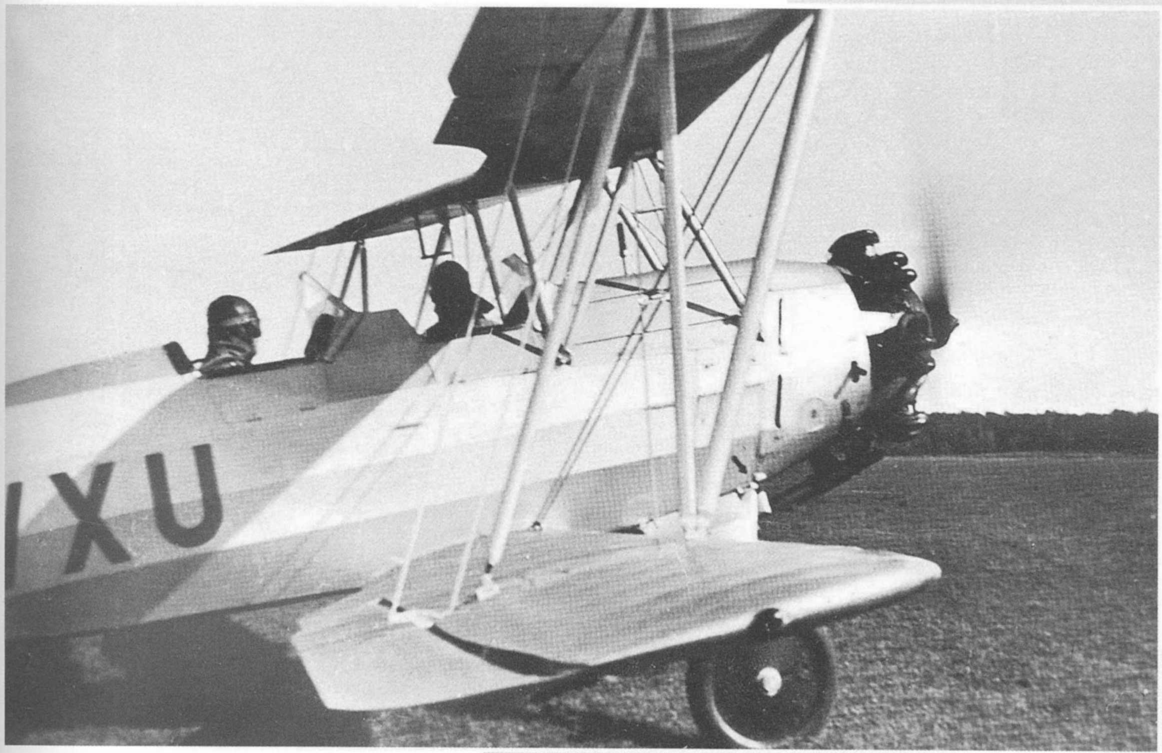
An unidentified pilot in the instructor's cockpit of a Fw 44, DA+??. Note the fuel gauge projecting up from the fuselage just ahead of the front windscreen.



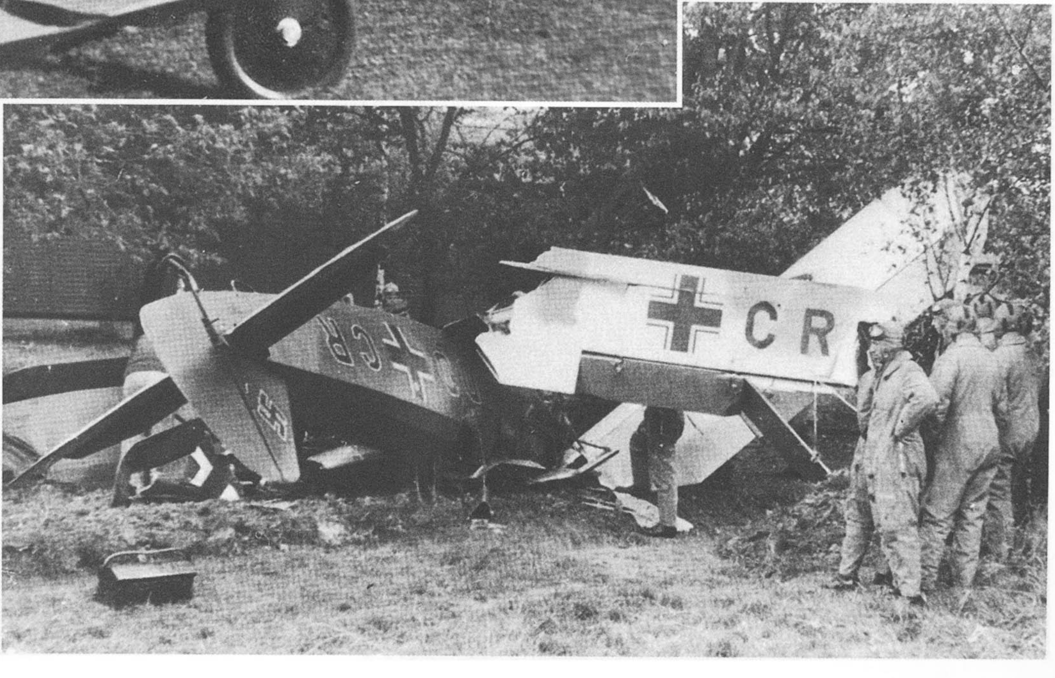
A silver Focke-Wulf Fw 44, PS+NV, belonging to Sch/FAR 13 or the later FFS A/B 13 comes in low over the boundary fence to land at Pilsen in Czechoslovakia.



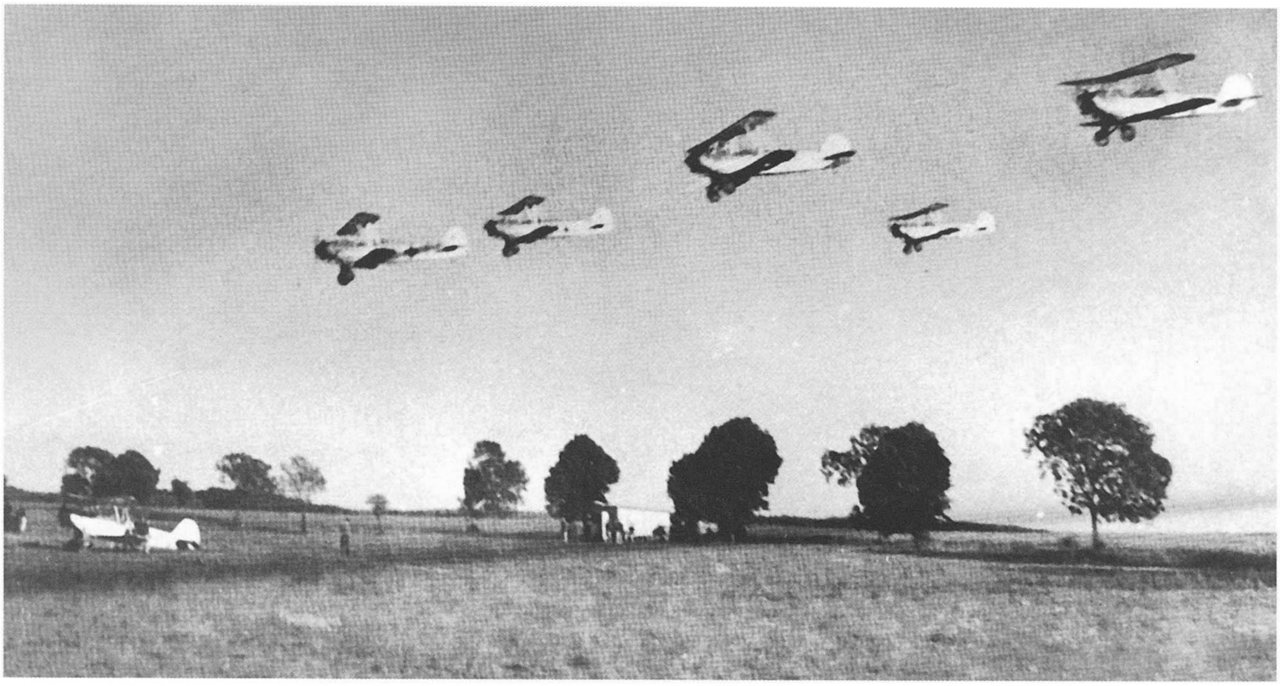
ABOVE: Four Focke-Wulf Fw 44 trainers, all finished in dark green upper surfaces, and so they probably date from about 1941 on. Visible codes, front to back, are KP+NJ, KP+NF, KP+NX, KP+ND. The unit may be A/B 119 in 1942, to which KP+ND is known to have been allocated.



An all-silver Fw 44 of an unknown unit taxies out for take-off on a routine training flight, probably immediately pre-war. Date and location unknown.

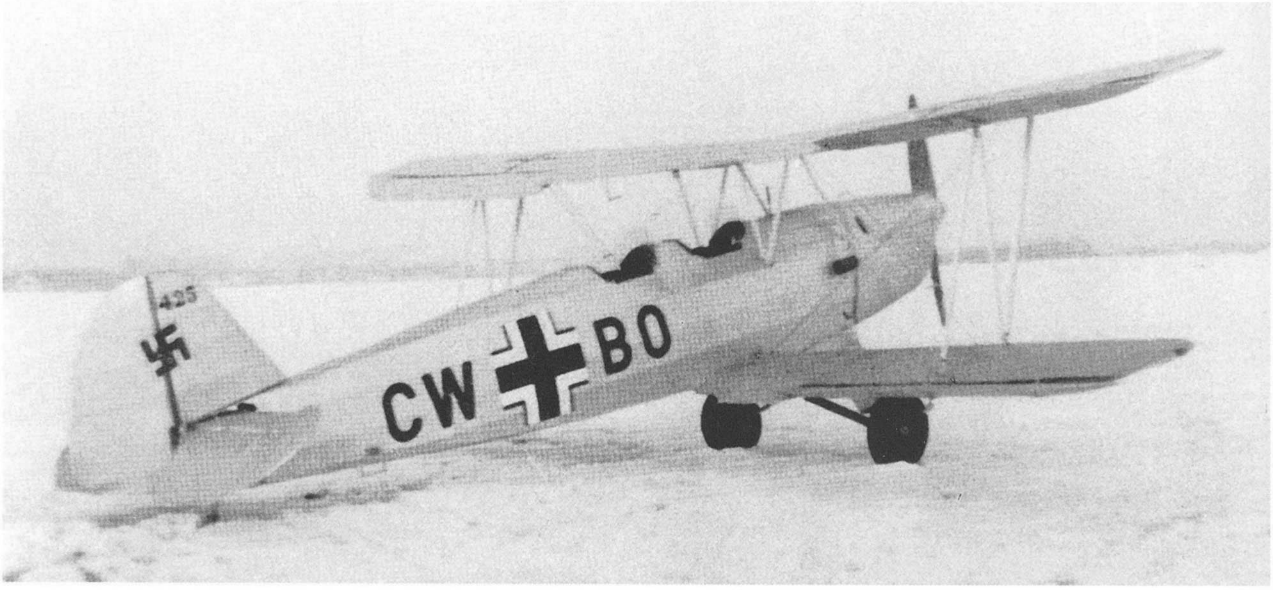


The wreckage of Focke-Wulf Fw 44, DD+CR, possibly from FFS A/B 13. Note the patchy dark green finish and the white outlined black letters. DD+CR had a surprisingly long career for a trainer, having earlier served with the JFS at Schleißheim in October 1933 and JFS 2 at Werneuchen in 1940. Both occupants of the aircraft when it crashed here apparently escaped serious injury.

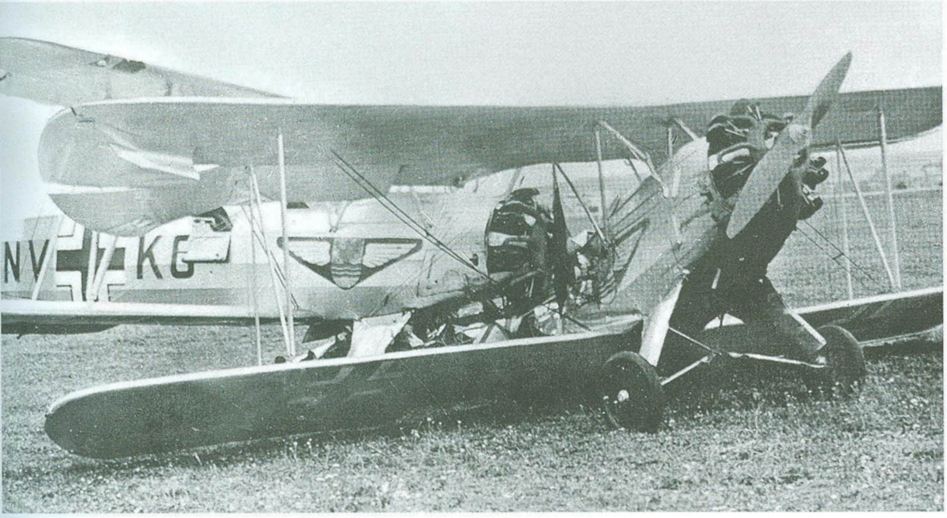


A flight of Fw 44s from an unidentified flying school demonstrate their formation flying skills.

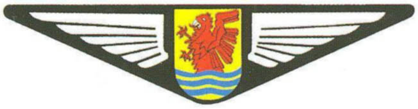
An Argus-engined Fw 44 E, CW+BO, W.Nr. 425, seen on an unidentified airfield, probably early in the war.



Pupil and instructor in their places in an unidentified Bü 131. The pupil in the rear seat looks slightly apprehensive.

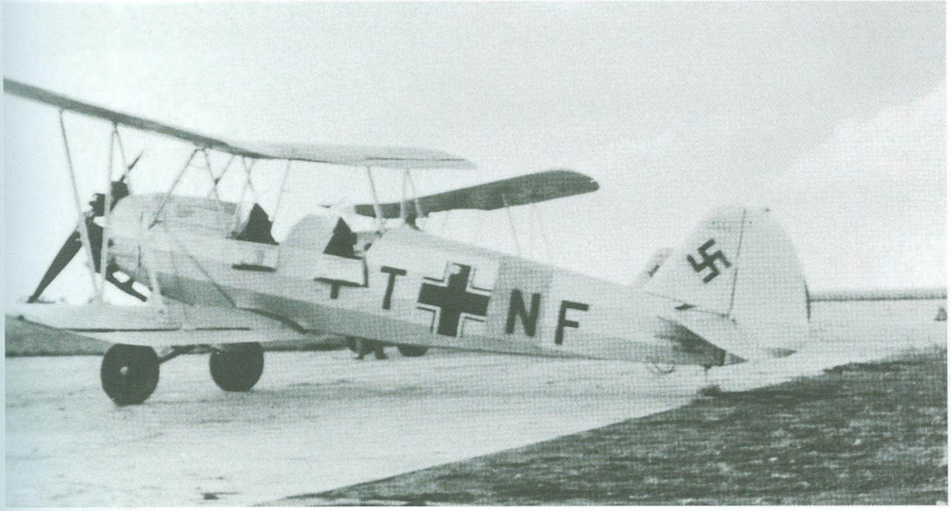


Two Fw 44s of A/B 71 at Prossnitz after a typical taxying accident, probably sometime in 1940-41. Both are finished overall silver and display the unit's magnificent winged griffon emblem.

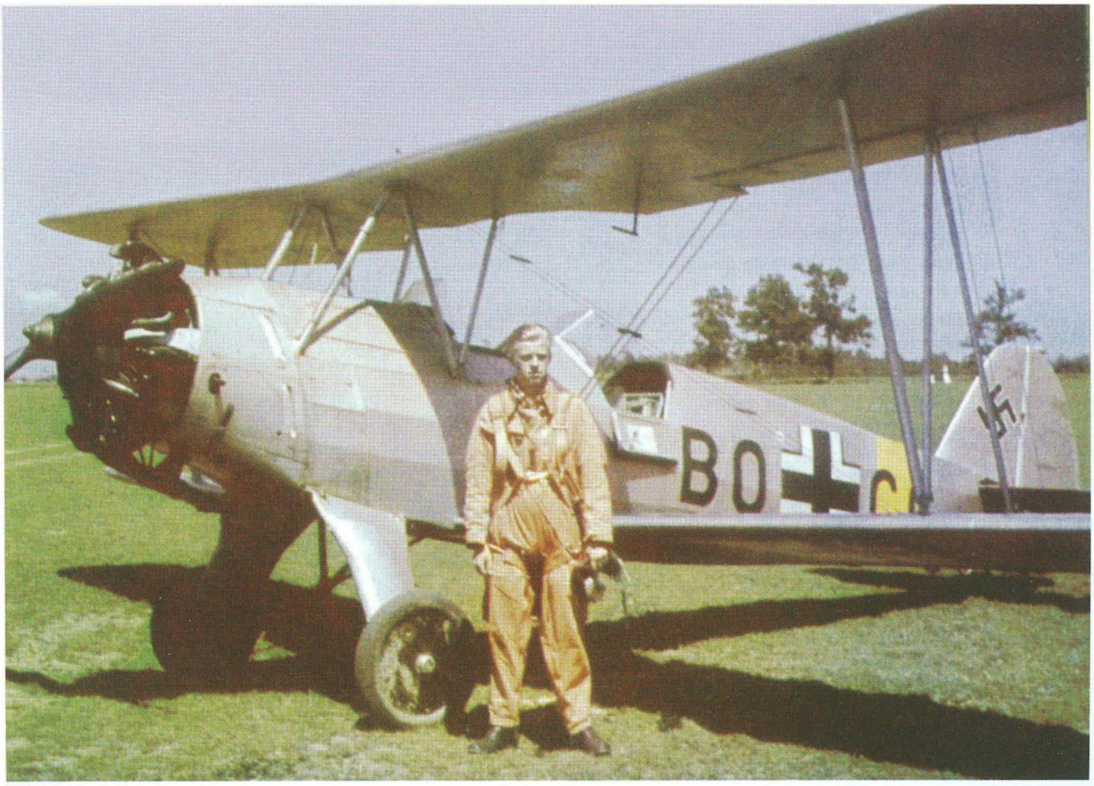


FFS A/B 71 Badge

View to port from the front seat of a Focke-Wulf Fw 44 as it sits on the flight line with two others. The next aircraft, ??+BM, has an unusual style of lettering.



An example of the Focke-Wulf Fw 44 F, workhorse of the Luftwaffe primary flying training schools. PT+NF, W.Nr. 2554, in service with FFS A/B 13, carries a dull silver finish and a yellow fuselage band and is seen at Pilsen, Czechoslovakia, sometime between 1940 and 1942.



Student pilot Hans Ille, who later flew with JG 26, poses in front of a Fw 44 'Stieglitz' coded BO+CC while undergoing the final part of his pilot training.

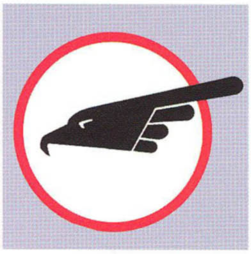
Heinkel He 72 *Kadett* (Cadet)

Another of the numerous two-seat German sports and training biplanes of the 1930s, the prototype Heinkel He 72 A, D-2574, first flew in 1933 and was powered by a 140 hp Argus As 8 B in-line engine. A totally conventional biplane of fabric-covered metal construction, with tandem seats in open cockpits, machines of this type equipped several NSFK units. After a short production run of He 72 As, most aircraft were built with the more powerful 160 hp Siemens Sh 14 A radial engine, which often made it difficult to distinguish them from the similarly powered Fw 44. In this configuration it was known as the He 72B and subsequently saw service at many *Luftwaffe* training schools. A single experimental example with floats, the He 72 BW, was built but was not proceeded with; the earlier and bigger He 42 was considered to be more efficient in this role. 30 He 72 B-3 *Edelkadetts* with spats over the mainwheels were built for civilian use. Final development of the He 72 family was the sole He 172, D-EEHU, which differed mainly in the use of a cowling for the Siemens engine. In the event only 235 He 72s were built as production priority was required for the far more important He 111 bomber.

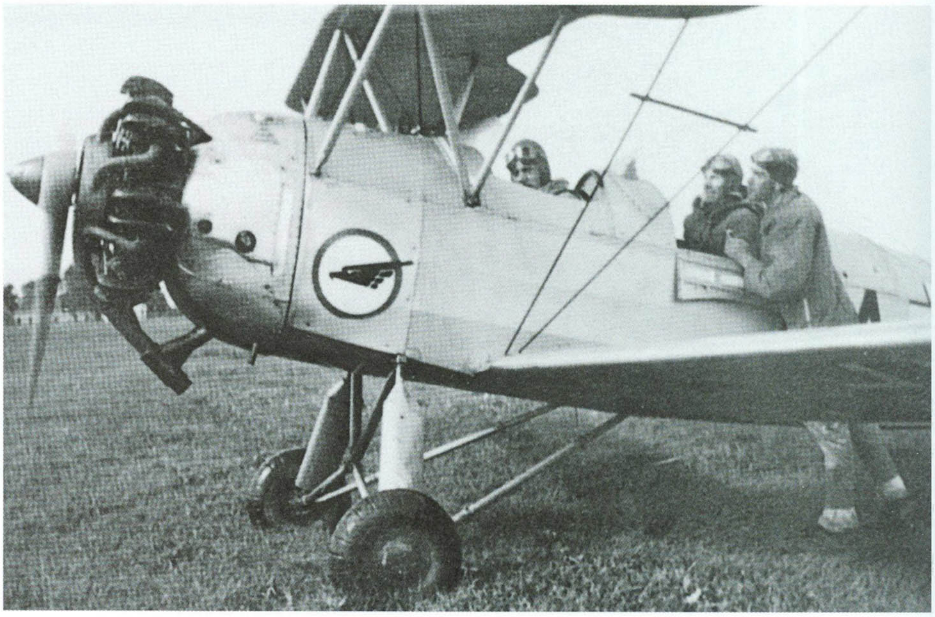
Robust, but with performance verging on the modest side, the He 72 seems to have been overshadowed by the more modern Bücker types, yet it had its moment of glory when ex-Slovak Air Force examples were used by the Slovak insurgent combined squadron for reconnaissance during the abortive uprising at Tri-Duby in summer 1944.

Specification

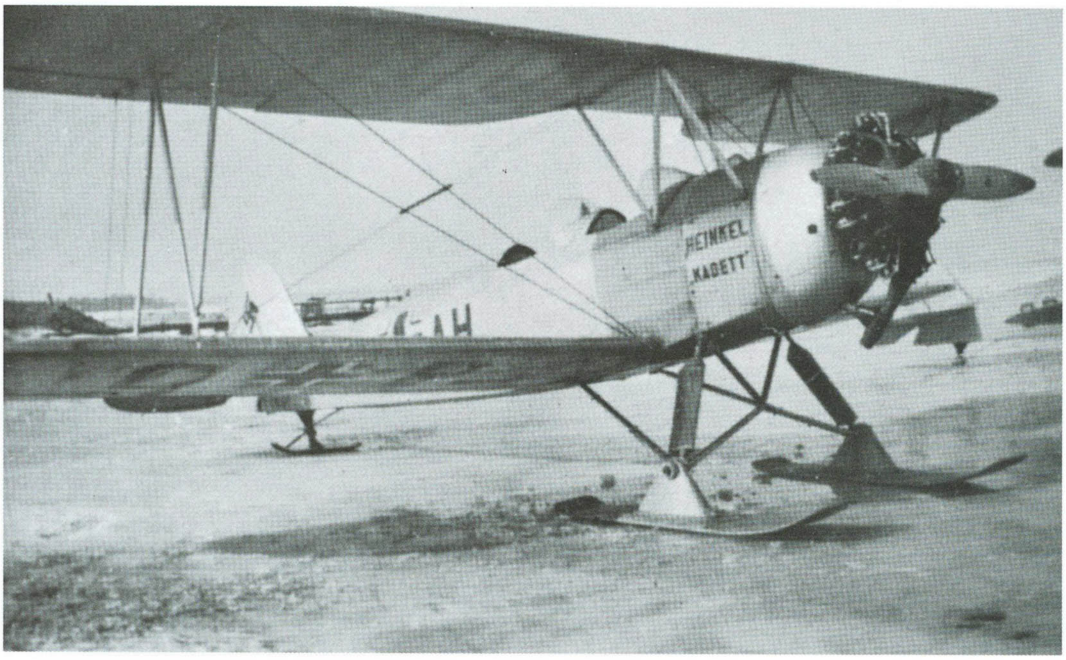
Span:	9.00 m (29 ft 6¼ in)
Length:	7.50 m (24 ft 7¼ in)
Loaded weight:	865 kg (1,907 lb)
Max speed:	185 km/h (115 mph)



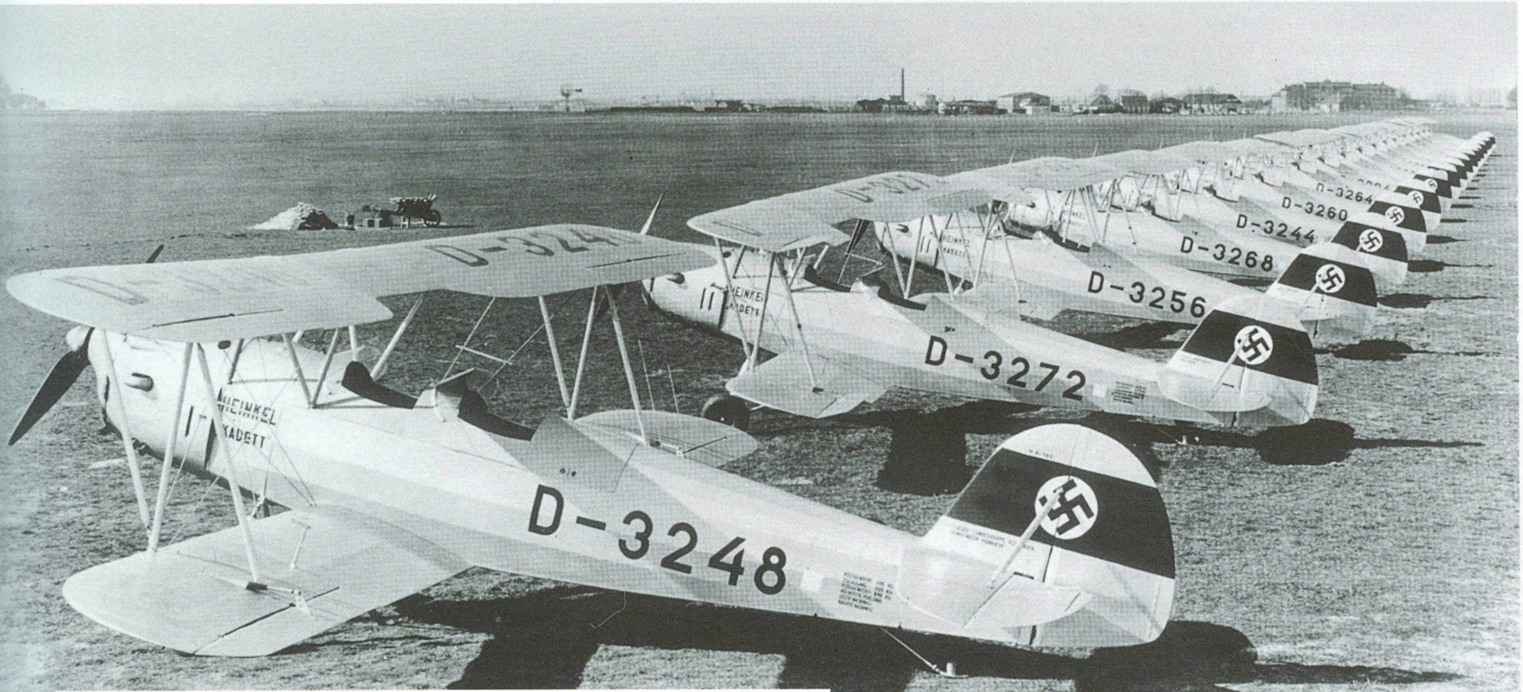
FFS A/B 71 Badge

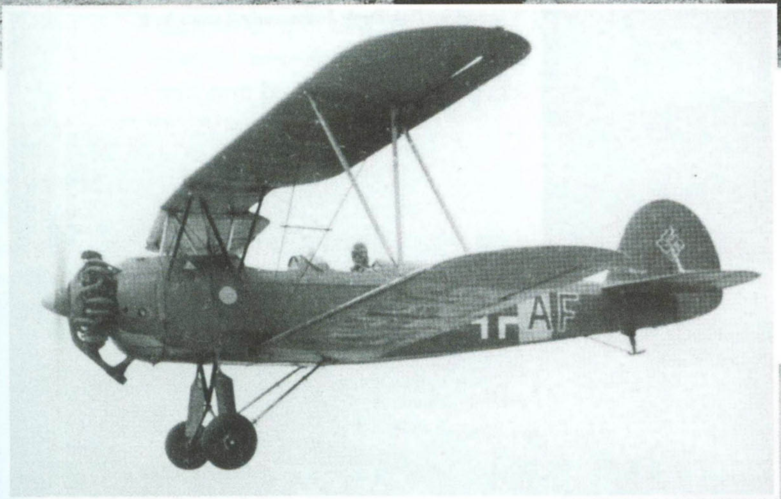


ABOVE: This He 72 B 'Kadett' was with FFS A/B 71 stationed at Olmütz, Czechoslovakia during May 1940.



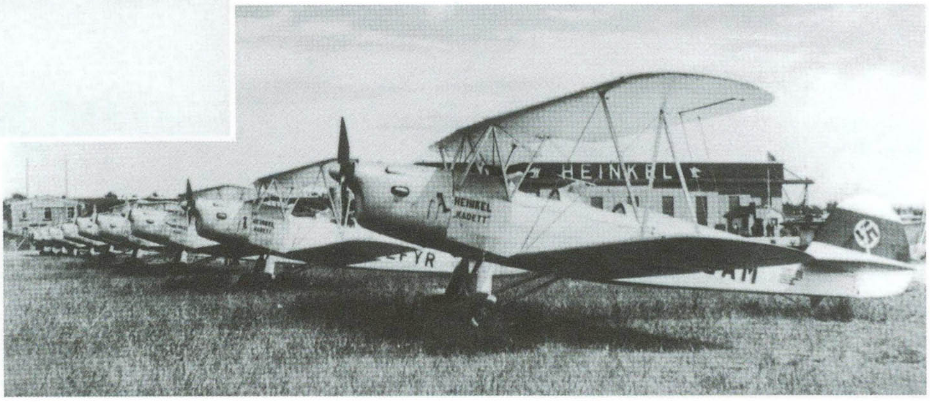
This He 72 'Kadett' coded CP+AH was used for stunt flying by the aerobatic ace Heinrich Falderbaum.

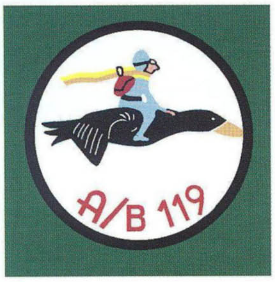

D-3248
HEINKEL
KADETT
D-3272
D-3256
D-3268
D-3244
D-3260
D-3264



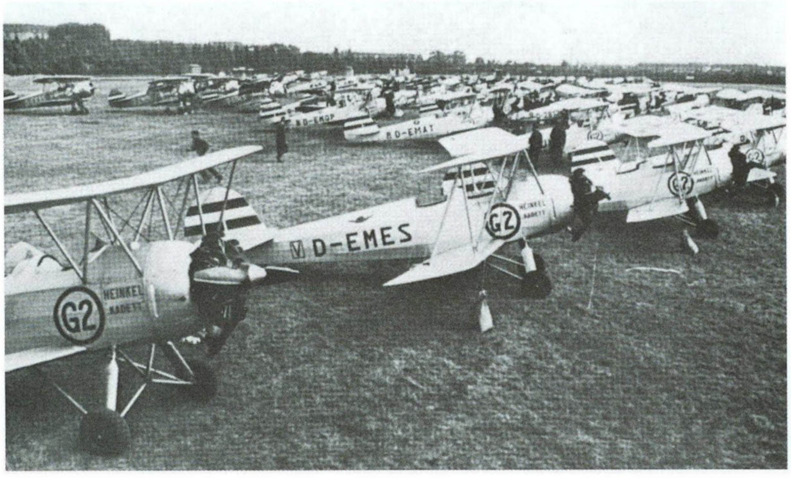
A line-up of He 72 Cs fitted with Argus 8 B engines, at the Heinkel works in Rostock. They carry some of the last batch of civil number codes allocated before the introduction of the new all-letter codes introduced after 20 March 1934. The first aircraft coded D-3248 is W.Nr. 562.

A trainee pilot with FFS A/B 119 making a solo flight in a He 72 B fitted with a Siemens Sh 14 A engine.


HEINKEL
HEINKEL
KADETT



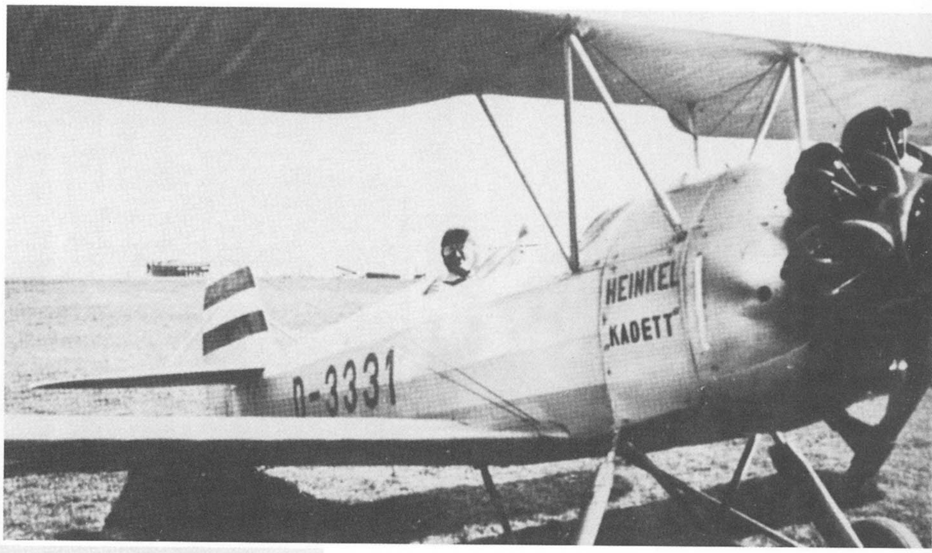
FFS A/B 119 Badge

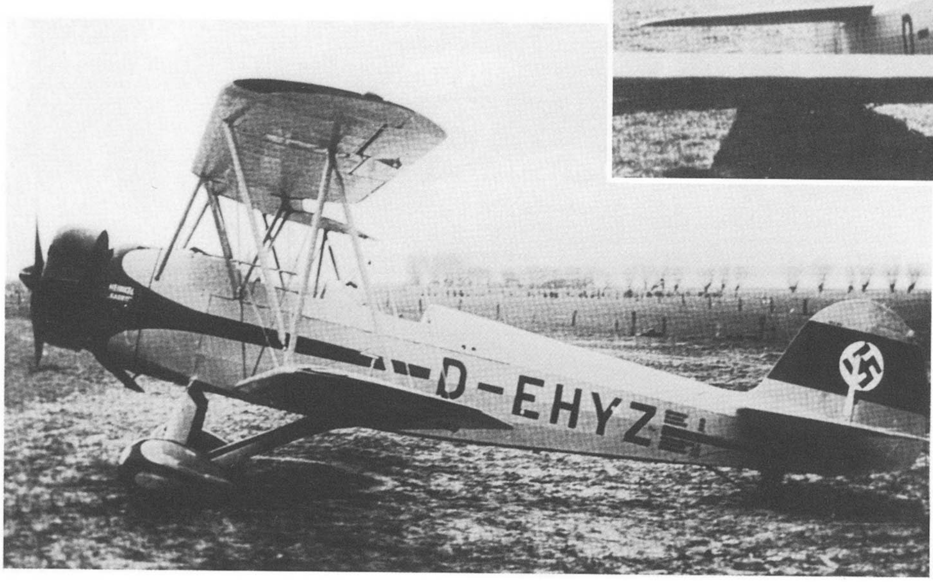

D-EMES
G2
HEINKEL
KADETT
D-EMAT

Another line-up of He 72 Cs at the Heinkel works in Rostock which now carry the all-letter civil codes which were introduced after 20 March 1934.

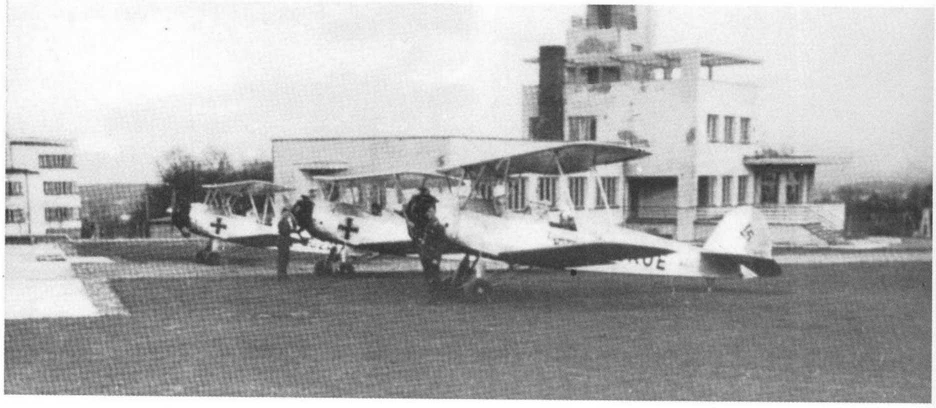
A group of six brand new He 72 Bs carrying all-letter civil codes which were used in the 1934 Deutschlandflug and were also used as trainers.

A Heinkel He 72 D 'Kadett' coded D-3331 being used as a sports-plane while at the same time being used as a clandestine trainer for the Luftwaffe.

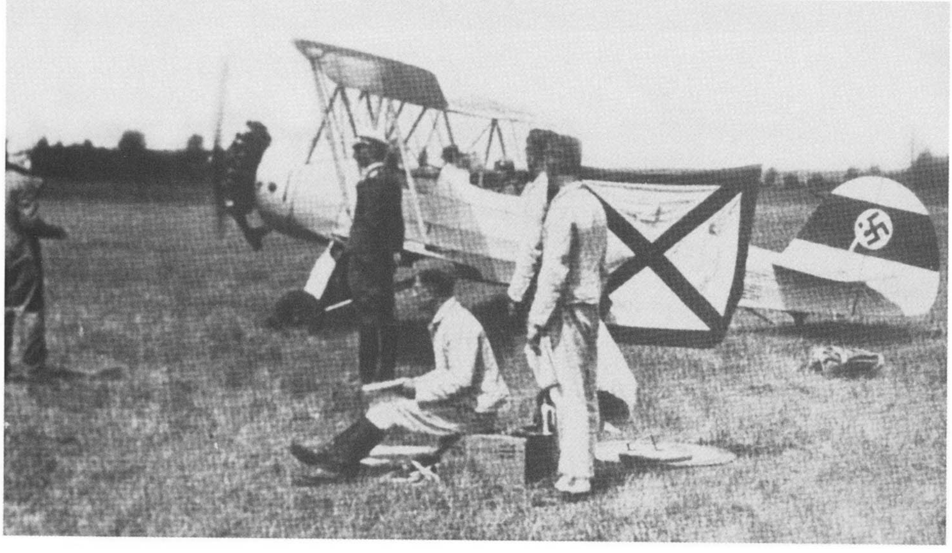




Still in civil markings with the all-letter code D-EHYZ introduced after 20 March 1934, this He 72 B-3 'Edelkadett' (Leading Cadet) was an improved variant having mainwheel enclosed spats and an engine cowling. Only thirty of this variant were built.



This photograph of a line-up of three He 72 Bs was taken at Olomoc airfield in Czechoslovakia during 1941. The first aircraft still has the five all-letter civil code and the two behind have had a Balkenkreuz added just in front of the front cockpit, indicating that these machines were used by the Luftwaffe in their training programme.



The trainee pilot in this He 72 B is waiting for the signal to take off on a solo flight while his instructor, having removed his parachute which lies near the tail of the aircraft, looks on. The officer standing beside the aircraft, is waiting to assess the performance of the student, while the ground crew look on with interest.

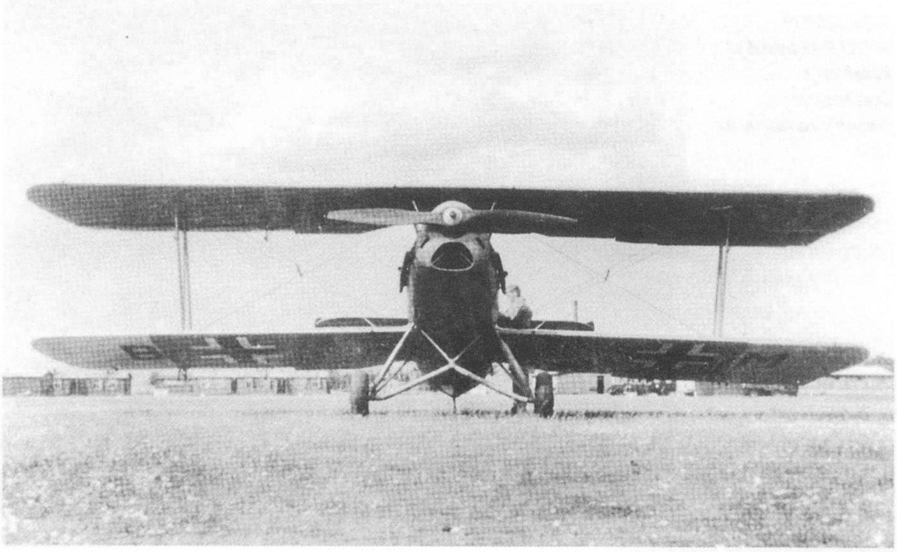
Arado Ar 66

One of the half-dozen or so small biplane types used as primary trainers by the *Luftwaffe*, the Ar 66 followed a similar formula of fabric-covered mixed wood and metal construction. An entirely conventional trainer, probably the most notable difference between the Ar 66 and other trainers was the use of a distinctive Arado-shaped rudder without a fin. Designed by Walter Rethel and first flown from Arado's Warnemünde factory in 1932, the prototype Ar 66a was powered by an Argus As 10C in-line engine of 240 hp. An essentially similar second landplane prototype was preceded by the Ar 66b floatplane which was fitted with twin floats attached to numerous struts. Ten of these were produced as the Ar 66 B in 1933 but failed to find favour and did not reach operational service. Production of 1,425 examples of what was probably the *Luftwaffe's* least known biplane primary trainer, began in 1933 as the Ar 66 C. Powered by the same Argus As 10C engine as the prototypes, the Ar 66 C was assigned to most of the A/B schools and performed well in steady, if unspectacular, fashion. Two examples used for instrument flying, DA+PI and SD+KV, served with A/B 71.

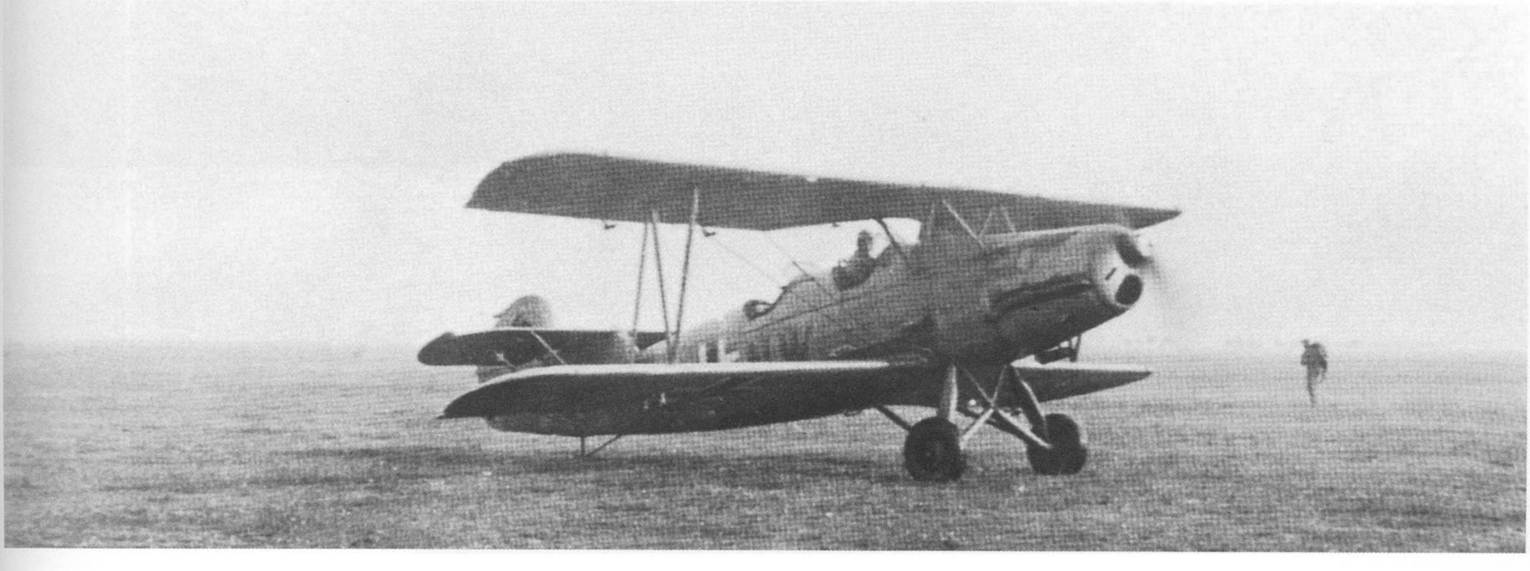
The unpleasant and irritating nocturnal activities of Soviet Polikarpov U-2 biplanes on the Eastern Front prompted the Germans to respond in kind. Casting about for a suitable vehicle, large numbers of sturdy and tractable Ar 66 C and Go 145 trainers were consequently selected to see action. Formed initially into *Störkampfstaffeln* (Night-harassing squadrons), these aircraft were reorganised in late 1943 into *Nachtschlachtgruppen* (Night Ground-Attack Groups), where they saw extensive service behind the Russian front lines dropping booby traps and light anti-personnel bombs. Numerous Ar 66 trainers were modified for this role with underwing bomb racks and operated on dark nights at treetop level, often fitted with ski undercarriages. Sixteen *Staffeln* were formed using these aircraft, including one manned by Estonians, two by Latvians and one by Russian volunteers.

Specification

Span:	10.00 m (32 ft 9¾ in)
Length:	8.30 m (27 ft 2¾ in)
Loaded weight:	1,330 kg (2,933 lb)
Max speed:	210 km/h (130 mph)

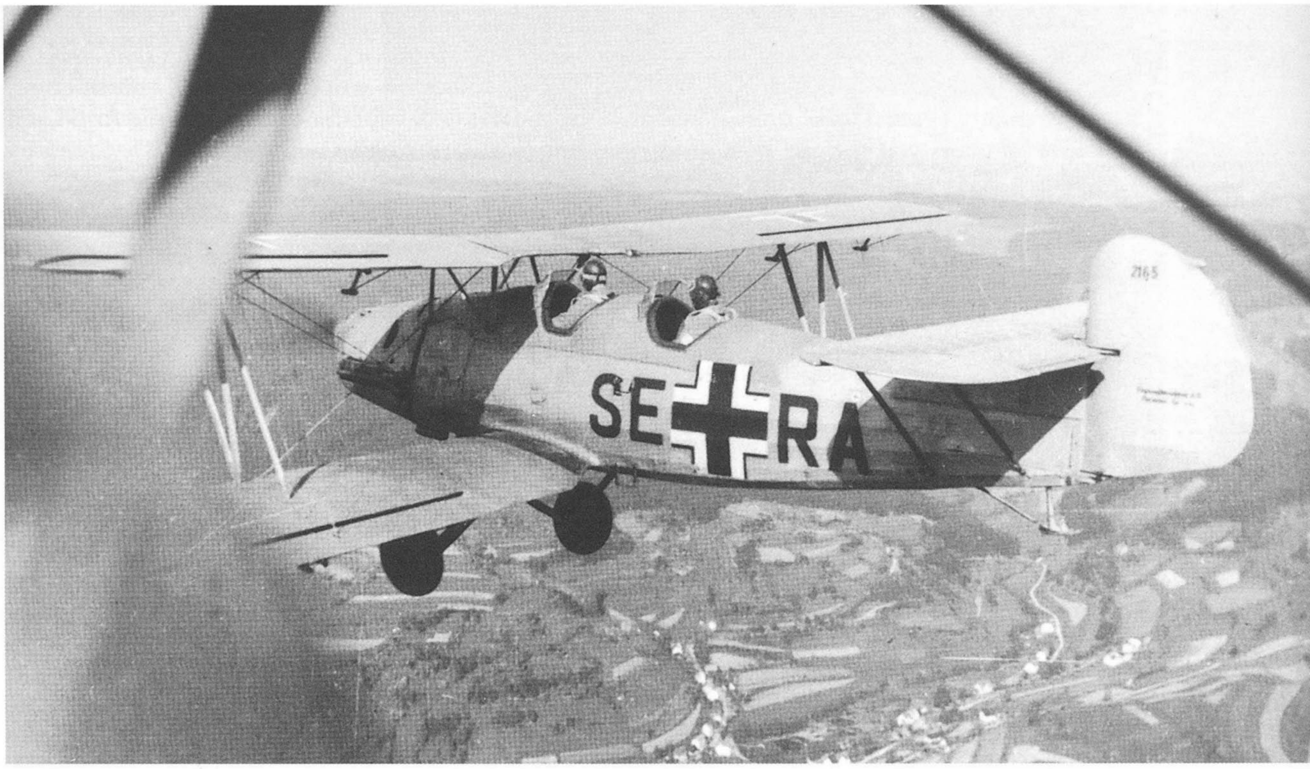


An unidentified Arado Ar 66, B?+?M, possibly of LKS 2 based at Reinsdorf, near Zwickau, finished overall in RLM Grey 02 with yellow tips to the underside of the lower wings.

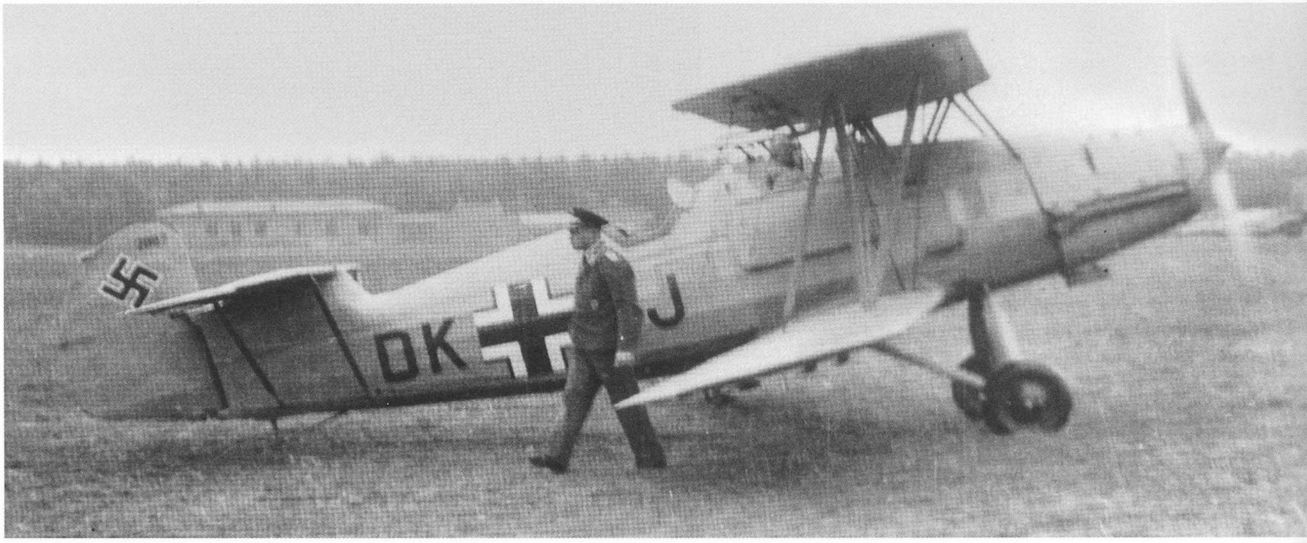


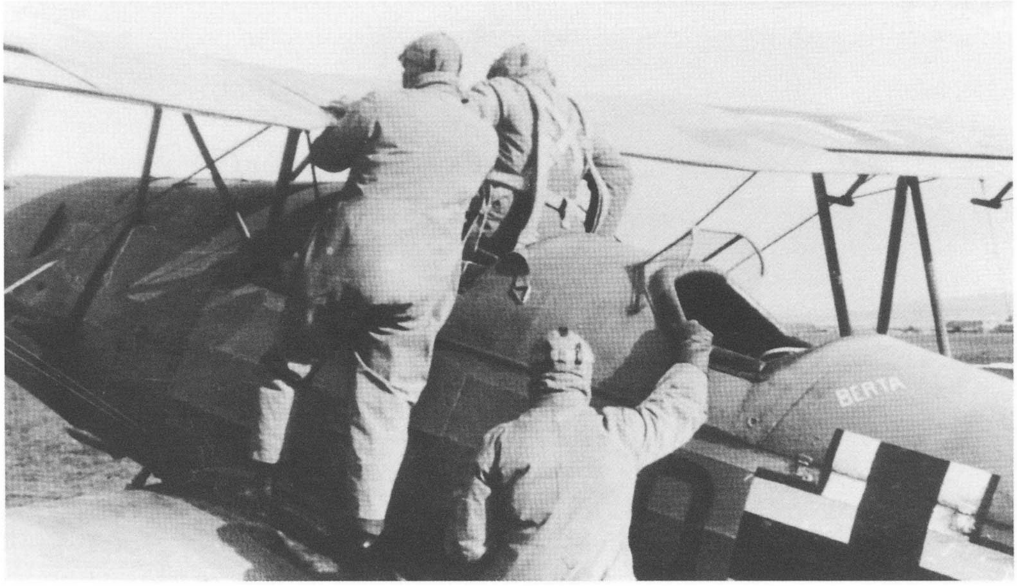
Arado Ar 66, ??+NW, ticks over as the instructor waits for his next student who is approaching the aircraft.

Overall RLM 02 Arado Ar 66, SE+RA, W.Nr. 2165, of FFS A/B 8 in flight over Karlsbad in June 1941.

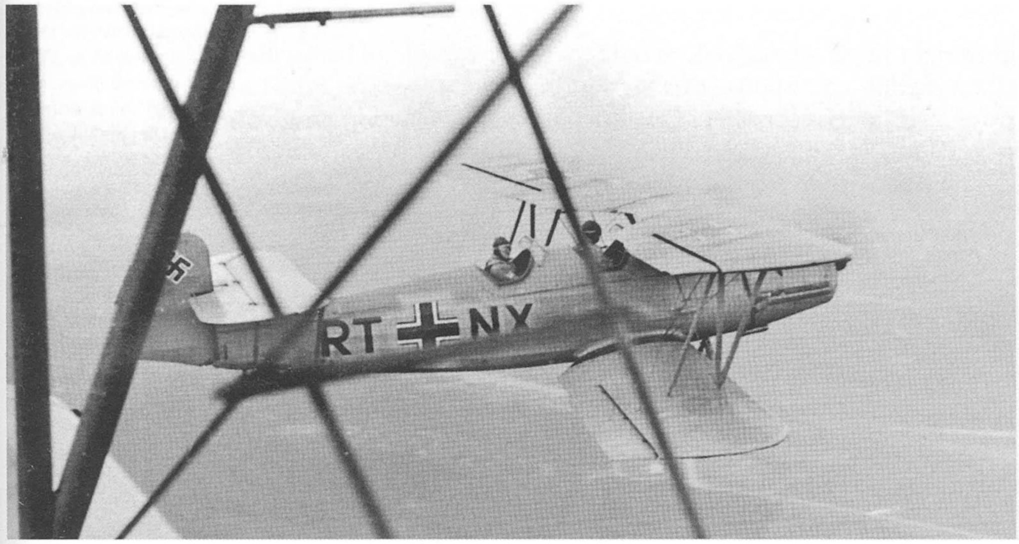


Arado Ar 66 DK+?J, W.Nr. 2087, of Sch/FAR 13 based at Pilsen in Czechoslovakia, probably sometime in 1940.



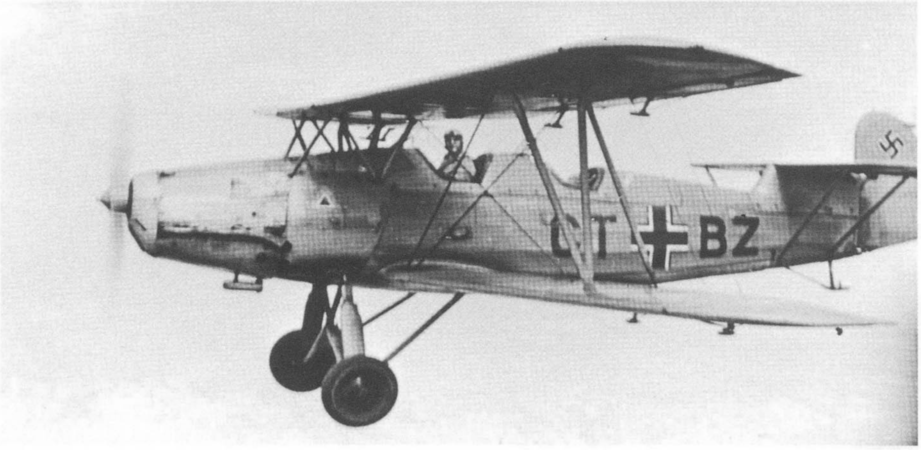


A trainee scrambles aboard an Arado Ar 66 of Sch/FAR A/B 13 for a flight from the airfield at Pilsen in Czechoslovakia. The aircraft is unremarkable except for the very unusual name 'Berta' just above the cross. Apart from one or two other examples seen on other aircraft of this unit, the practice of giving training machines individual markings was practically unknown in the Luftwaffe – and probably most other air forces.

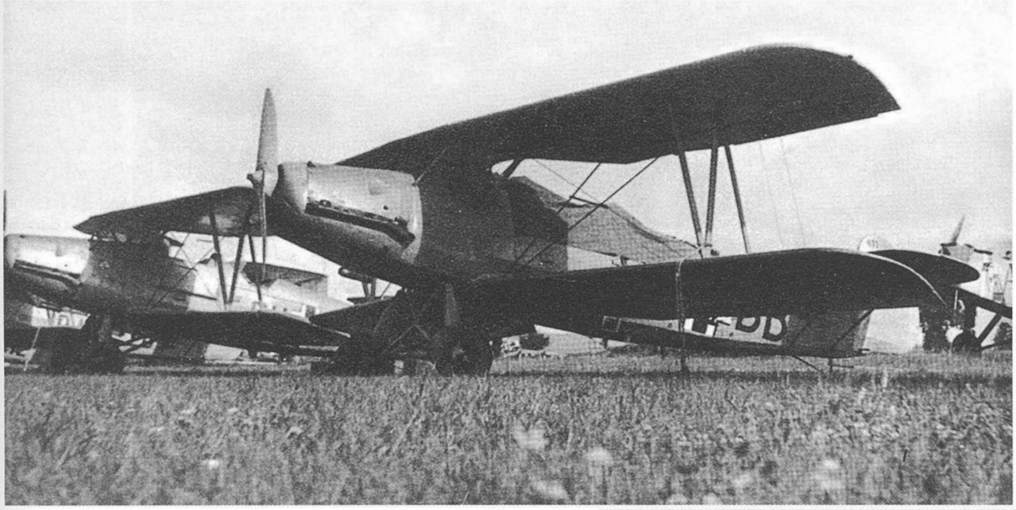


Air-to-air view of an all-grey Arado Ar 66, RT+NX, possibly of Sch/FAR 13, in flight over the countryside somewhere near Bayreuth. Note how the letters on the fuselage have been painted over an earlier larger marking. The code letters have also been painted on the upper wing surface, a fairly uncommon practice. (AMC)

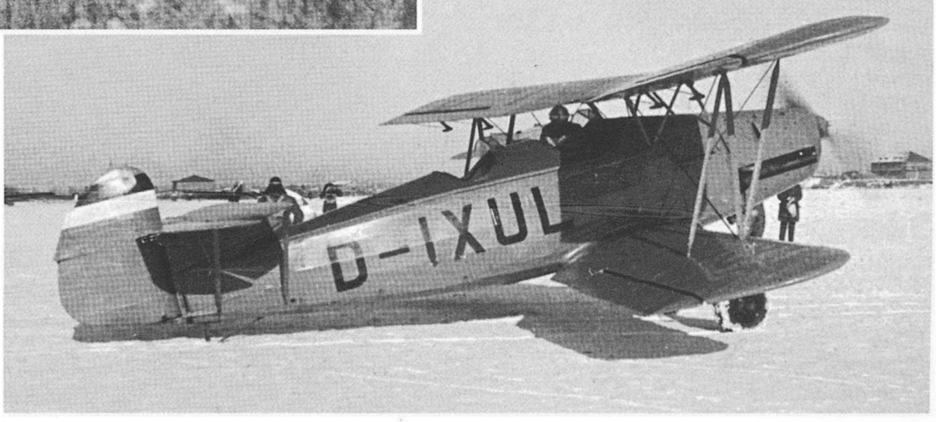
Arado Ar 66, CT+BZ, believed to be from Sch/FAR 13 in Pilsen. The school did not become FFS A/B 13 until October 1941.



Arado Ar 66 trainers tied down and with cockpit covers in place. Nearest is W.Nr. 411, coded ??+BB. Date, unit and location are unknown.



In a pre-war winter, this Arado Ar 66, with a civil code D-IXUL and national tail marking, has the student running up the engine while waiting for the pilot to join the aircraft.

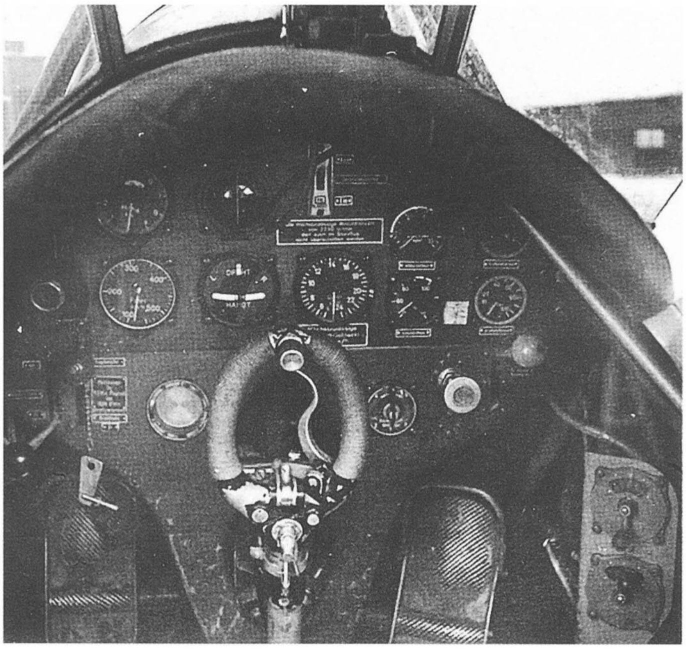


Arado Ar 76

Originally designed as a lightweight single-seat advanced fighter-trainer capable of being used as an 'emergency home defence fighter' in response to a request from the still-secret RLM in 1934, the Ar 76 was just one of four designs considered for the purpose. Competing proposals were also prepared by Focke-Wulf, Henschel and Heinkel. The specification indicated a marked preference for a monoplane to be powered by the Argus As 10 C liquid-cooled engine and with an armament of two 7.9 mm MG 17 machine guns and three 10 kg bombs in the fighter role. As a trainer, the only armament required was a single MG 17.

Arado's prototype was a strongly-built parasol with a simple tubular steel fuselage with a covering of alloy and fabric, while the wings were constructed from fabric-covered wood. The elegant but heavy little machine had provision for the two required guns in the classic nose position, with a small bay just behind the engine to hold three bombs. D-ISEN, the first prototype, was lost early in the test programme and was followed by two other prototypes which had modified tail surfaces. In the evaluation of the competing designs, Focke-Wulf's Fw 56 *Stösser* gained first place, although the Ar 76 came such a close second that a small production batch of 182 of the type was ordered as a backup. These were delivered to the *Luftwaffe* as trainers in the spring of 1936. Some are known to have later served with FFS A/B 8 at Vilseck, FFS A/B 23 at Kaufbeuren and with LKS 1 at Kamenz.

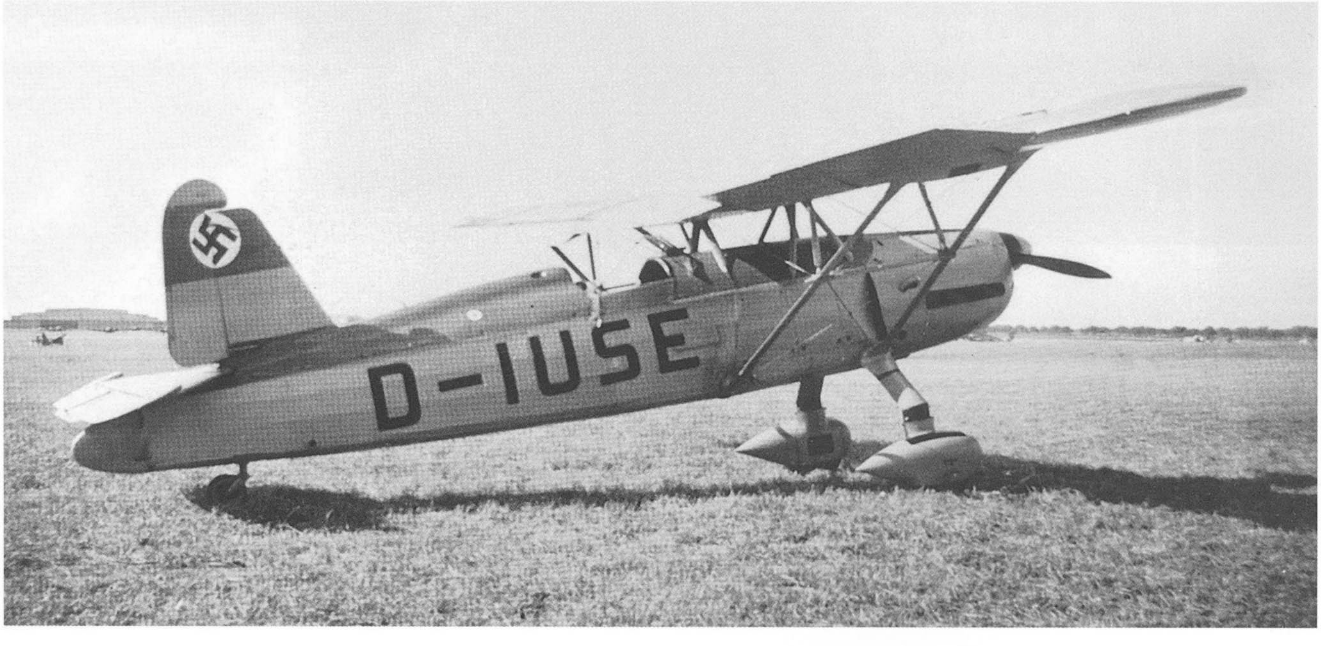
The cockpit of a real aeroplane! Note the prominent gun firing button on the control column which would have encouraged any budding fighter pilot.



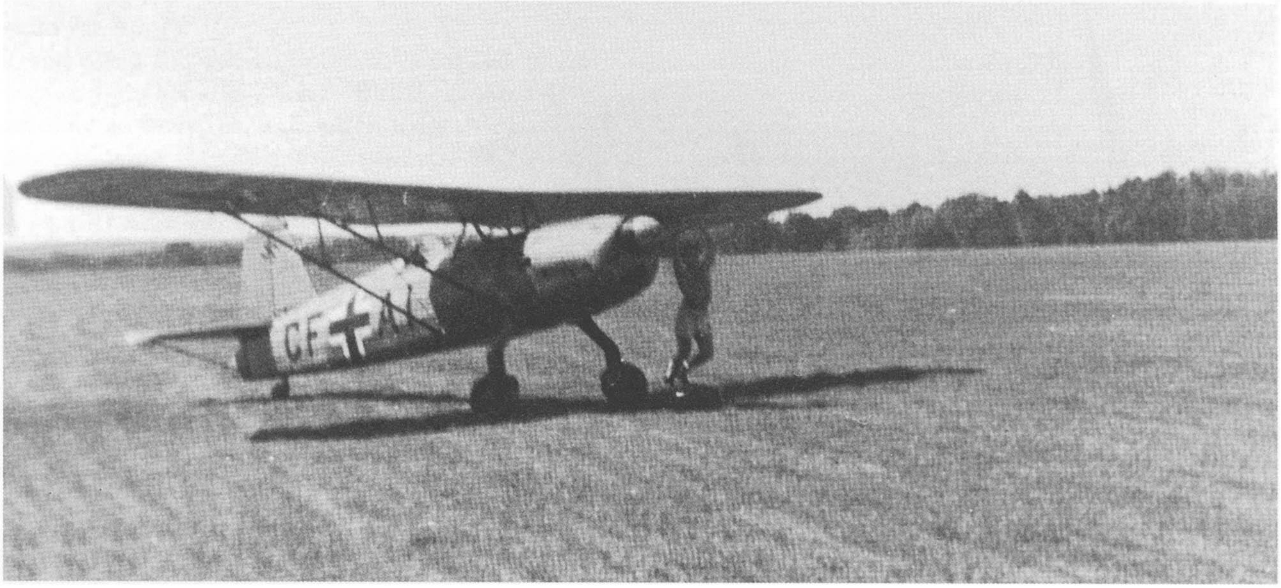
Specification

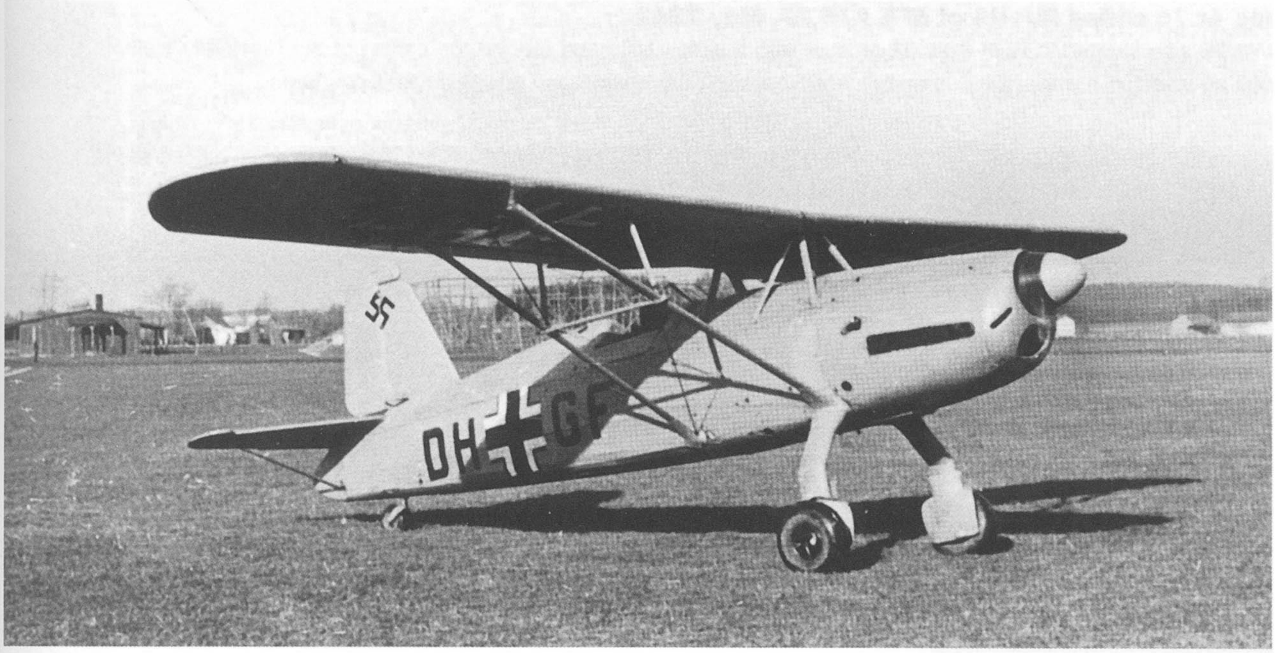
Span:	10.88 m (35 ft 8 1/2 in)
Length:	10.30 m (33 ft 9 1/2 in)
Loaded weight:	2,125 kg (4,684 lb)
Max speed:	349 km/h (217 mph)

Arado Ar 76, D-IUSE, in use as a fighter trainer, probably before the outbreak of World War II. The fuselage spine is painted, probably in dark blue, but the registration is a puzzle as it should indicate that the aircraft is a marine Class 'B' type of 5,000 kg! The location is uncertain, but could possibly be Bernburg. (AMC)

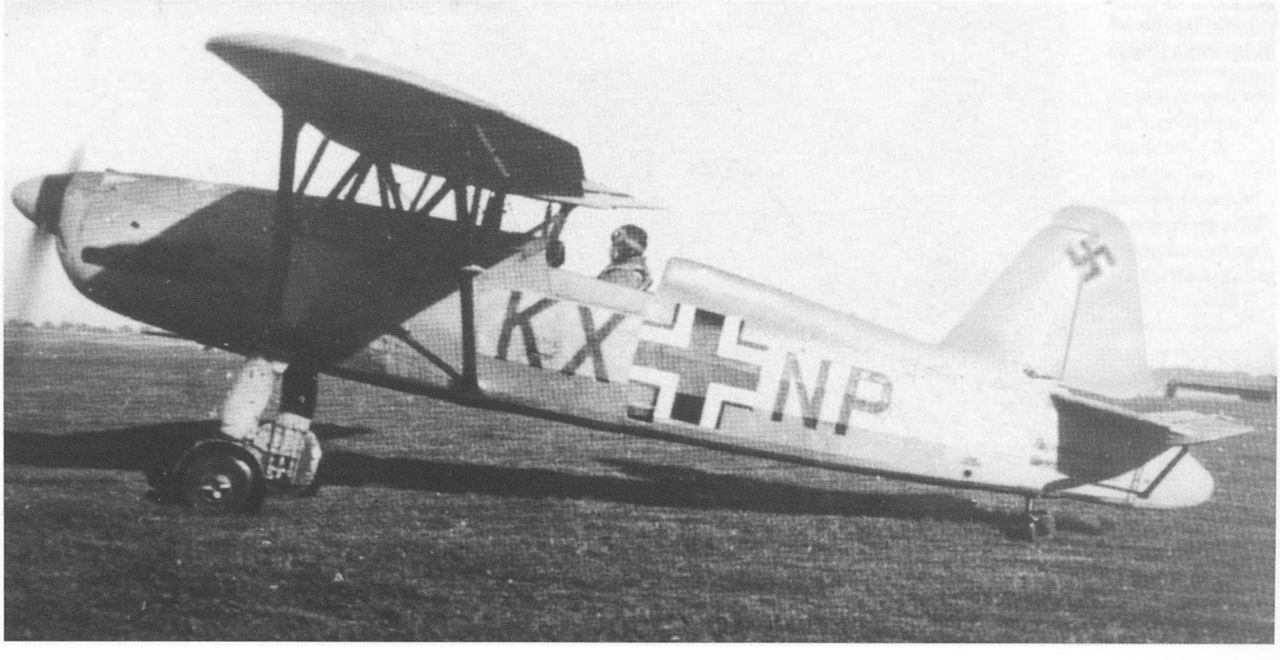


A helping hand for the pilot of this Ar 76 coded CF+AI, as he taxies out for take-off. Originally allocated to LKS Berlin-Gatow in April 1936, the aircraft was with that school when it became LKS 2 in January 1940. By late 1942 it was still in service with JFS 6. It is unknown which school it was with when this picture was taken.

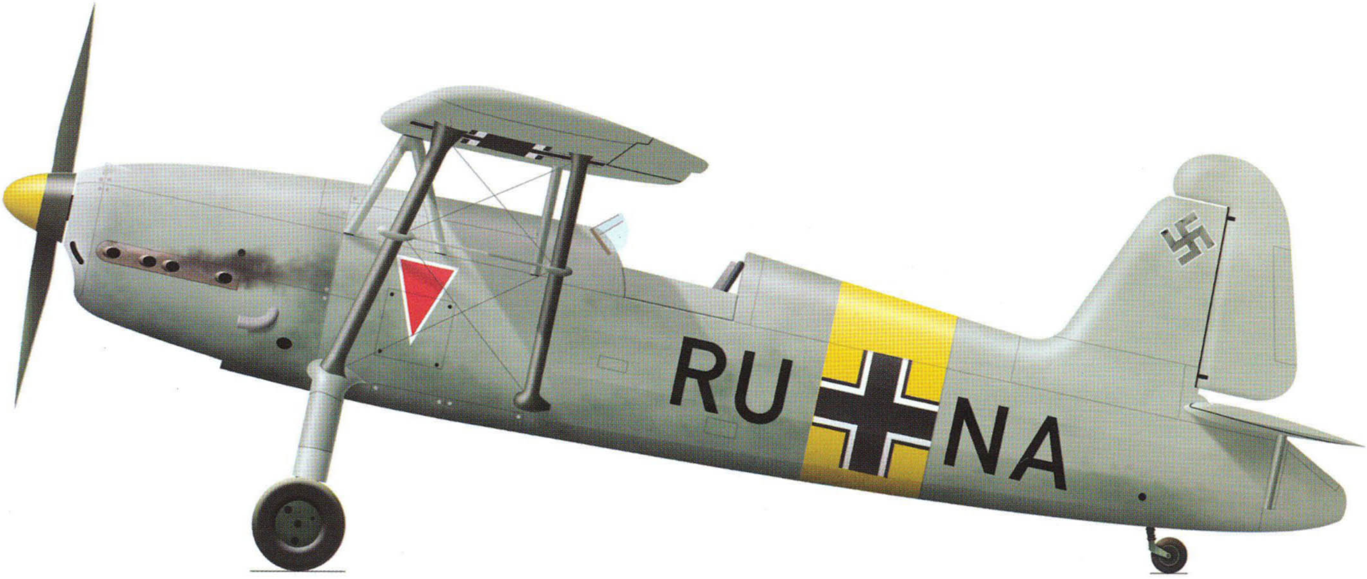




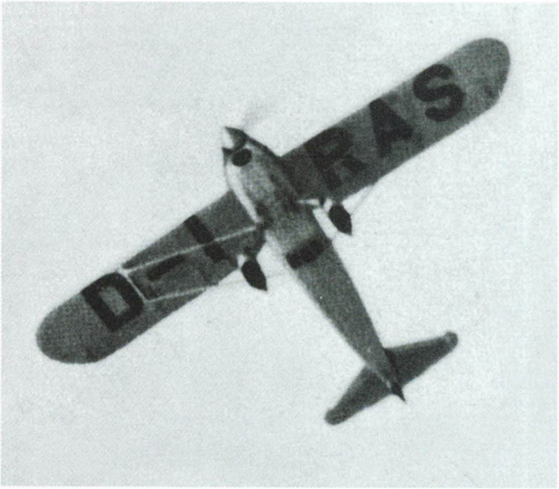
Arado Ar 76, DH+GF, taxies in. Probably still painted overall RLM 63 Grau, the aircraft retains the swastika in the early central position on the fin and rudder. A tiny W.Nr. can just be made out on the tip of the rudder. The machine is in service with either LKS 1 or FFS A/B 117, both of which were at Kamenz in 1940-41 when this picture was taken. (AMC)

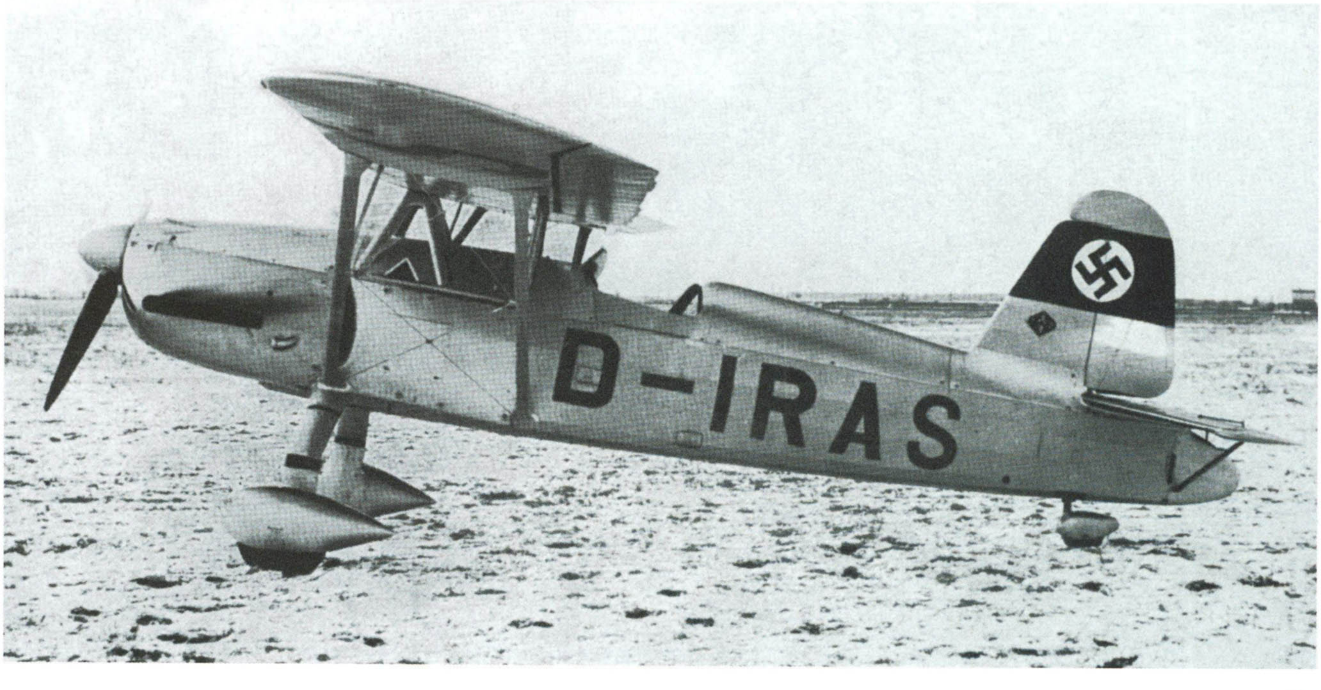


The small size of the bandy-legged Ar 76 is shown well in this picture of KX+NP, possibly at Gõrlitz. Despite the well-worn finish, the sun still reflects strongly from the tail. Originally with FFS A/B Plauen in late 1939, the aircraft later served with A/B 1 and A/B 7.



Arado Ar 76 coded RU+NA of FFS A/B 23, May 1942
This Ar 76 was painted in RLM Grey 02 all over with a yellow tail band around the centre of the fuselage. It also carried an inverted red triangle outlined in white between the engine and pilot's cockpit position.





Three views of an Ar 76 coded D-IRAS being tested at the Arado factory in Brandenburg near Berlin. This aircraft was used as a single sea trainer for pilots reaching the end of their training for solo flights.

Arado Ar 96

Far and away the most important advanced trainer in the *Luftwaffe* inventory, the Ar 96, designed by *Dipl.-Ing.* Walter Blume (a First World War *Pour le Mérite* holder), was an extremely advanced aircraft when it first flew in 1938. D-IRUU, the Ar 96 V1, was a very clean low-wing monoplane of all-metal construction with tandem seats for instructor and pupil beneath a fully-glazed canopy and an outward retracting undercarriage. Powerplant was the popular Argus As 10 C in-line engine. A distinguishing feature was the typical tall Arado fin and rudder assembly. Apart from changing the undercarriage to an inward retracting type to better withstand the rough handling by ham-fisted pupils, the type was accepted for production with little change. A small batch of Ar 96 A-1s was completed in 1939, but they were felt to be underpowered and consequently the Ar 96 B, powered by the Argus As 410 engine of 465 hp and with a lengthened fuselage to accommodate more fuel, became the main production variant. First deliveries from the Arado and AGO factories joined the training schools in summer 1940. The Ar 96 B-1 was unarmed; the B-2 and B-3 series carried a single MG 17 in the starboard upper engine cowling; the B-5 was also fitted with FuG 16ZY VHF radio; the B-6 tested underwing bomb racks and resulted in the B-7 production version. There was no B-4. A single machine was tried out with a single MG 15 on a flexible mounting in the rear cockpit, while a small pre-production batch fitted with a small belly window for bomb-aiming practice and a 480 hp Argus engine was known as the Ar 96 C.

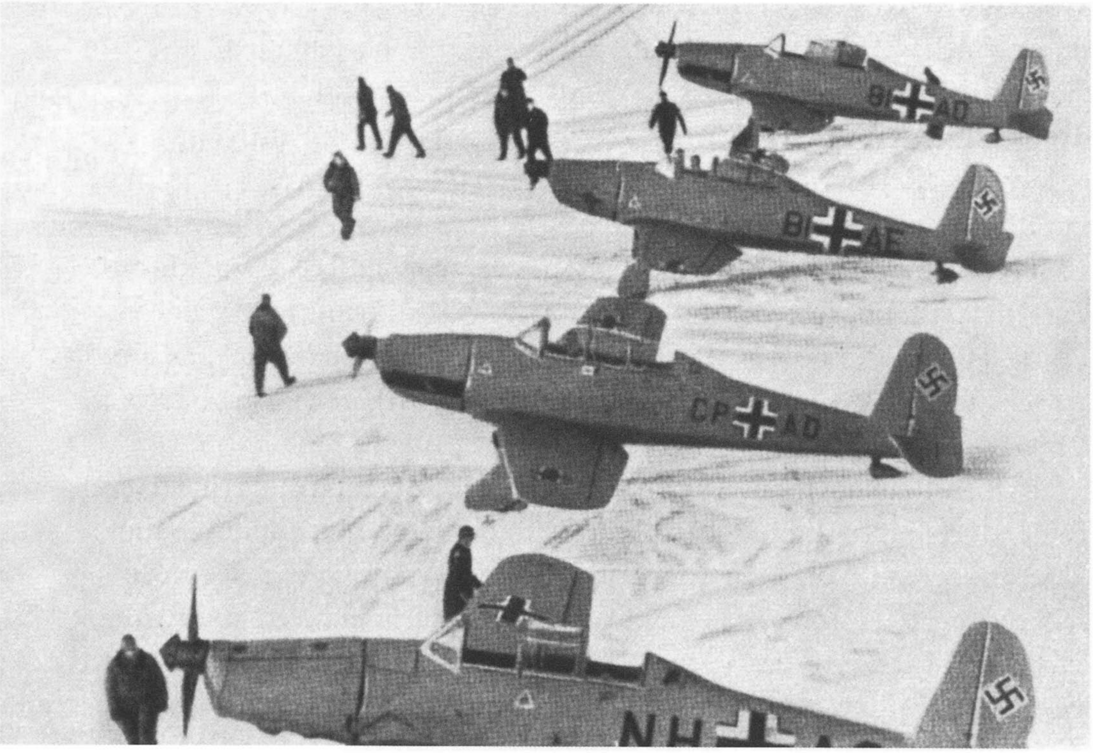
Much of the early Ar 96 production was carried out in the AGO plant, but from mid-1941 the Avia company in Prague took over. Avia was joined by the Letov factory from late 1943 and the two completed the bulk of the 11,546 machines built. The Czechs continued production of the Ar 96 as the C-2 until 1949.

Apart from the A/B schools, thirteen *Jagdschulegeschwader* (fighter-training wings) eventually used the Ar 96, as well as the replacement units (*Ergänzungsjagdgruppen* – EJG) and the officer cadet schools (*Luftkriegsschulen* – LKS).

The qualities of the Ar 96 naturally recommended it to Germany's allies; consequently 65 Ar 96 As and 45 Ar 96 Bs were used by the *Magyar Királyi Honvéd Légierő* (Hungarian Air Force). One example of the Ar 96 B was also licence-built by the Hungarian MÁVAG concern. A single Ar 96 A and three Ar 96 B types were also used by the Slovak Air Force (*Slovenské Vzdušné Zbrane*).

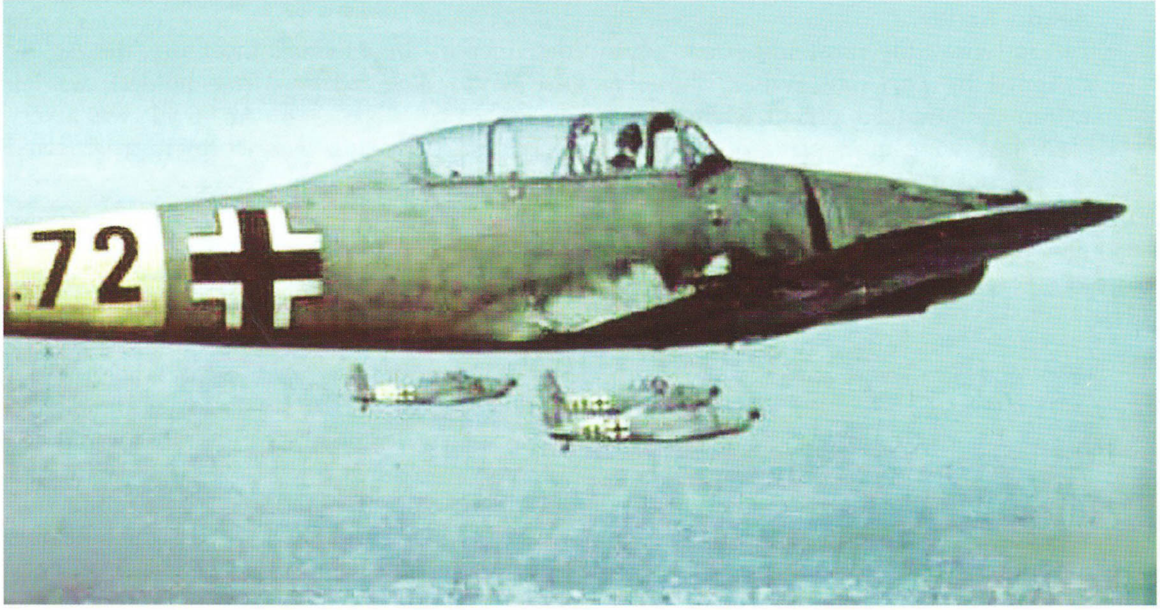
Specification

Span:	11.00 m (36 ft 1 in)
Length:	9.13 m (29 ft 11 1/4 in)
Loaded weight:	1,695 kg (3,747 lb)
Max speed:	330 km/h (205 mph)

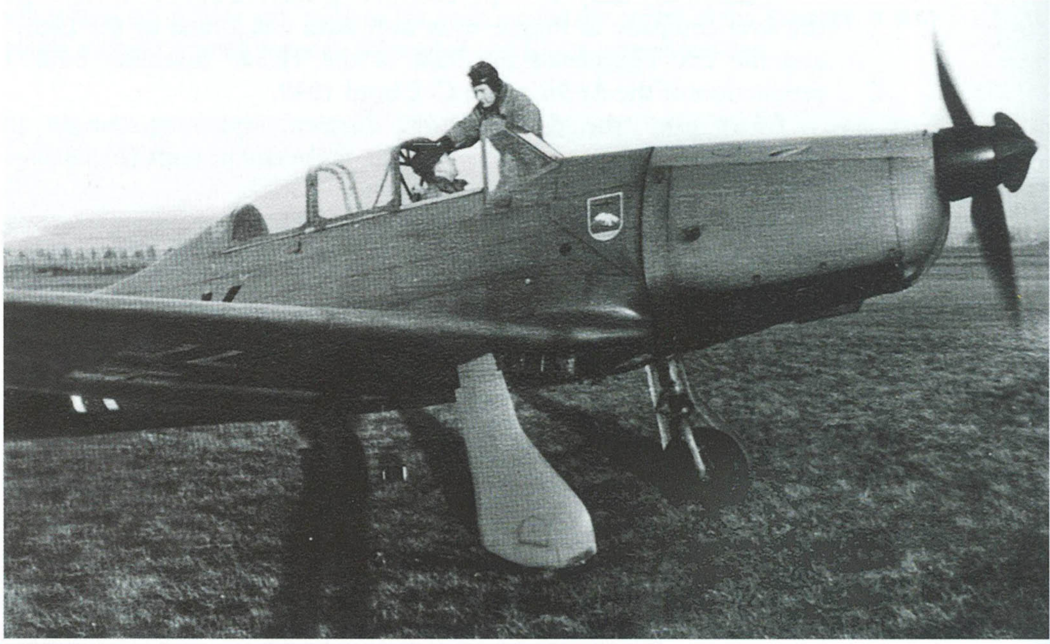


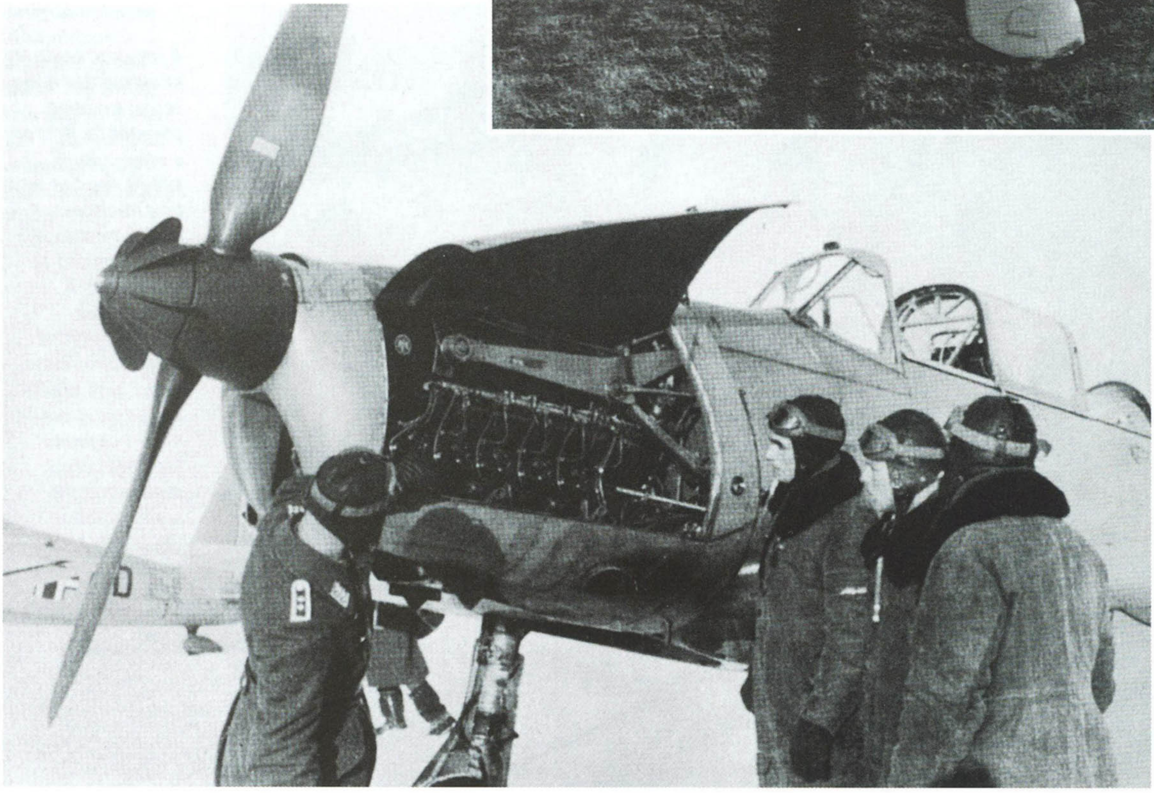
A line-up of Ar 96s of an unidentified flying school are being prepared for flight on a snow-covered airfield. The first and third machines are Ar 96 B variants with the second and fourth being 'A' variants. Two instructor pilots of the machines in the centre have already started the Argus As 410 A-1 engines. Identified codes starting from the second machine are CP+AD, BI+AE and BI+AD.

A formation of overall grey Ar 96 As in use with an unidentified flying school.

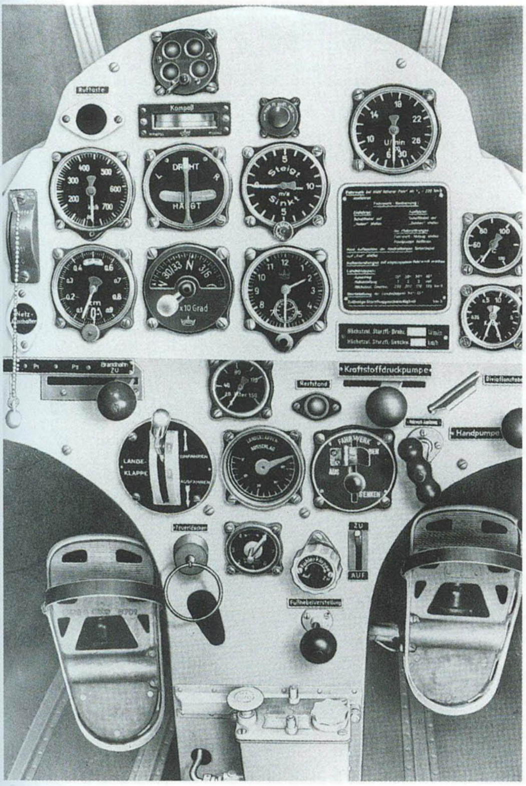


Another overall RLM Grey 02, Ar 96 B wearing the emblem of FFS A/B 72.

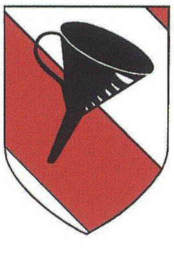




Student pilots are being shown the workings of the 456 hp Argus As 10 C eight-cylinder inverted-vee air-cooled engine by an instructor pilot.

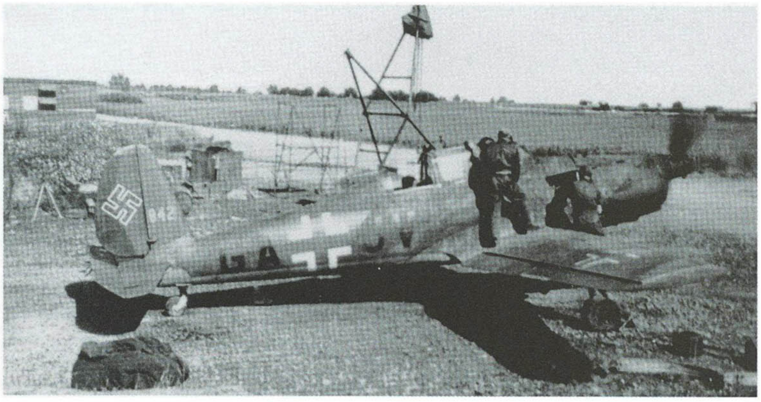


The front cockpit of an Arado Ar 96 B.

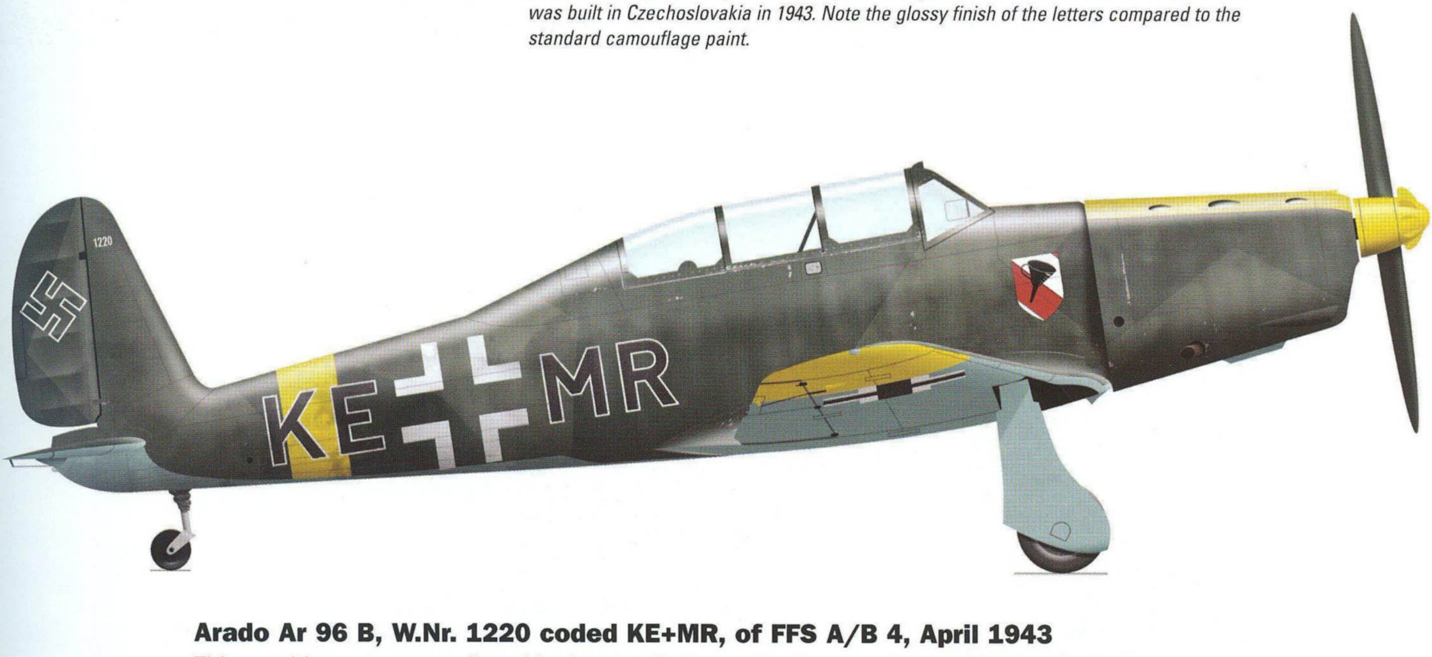


FFS A/B 4 Badge

A view of the instructor in the front seat of an Arado Ar 96 B. Note the roll-over pylon.

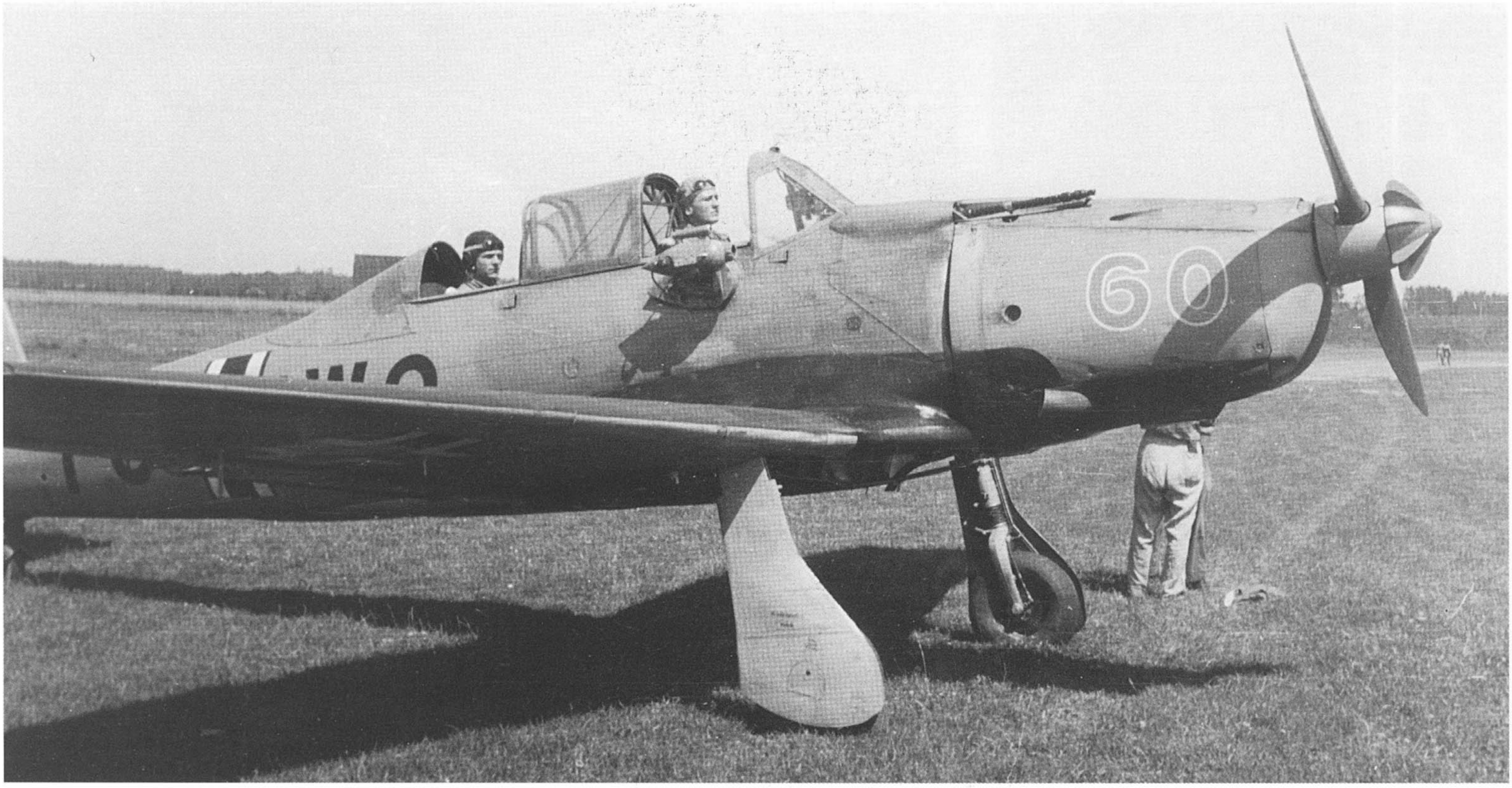


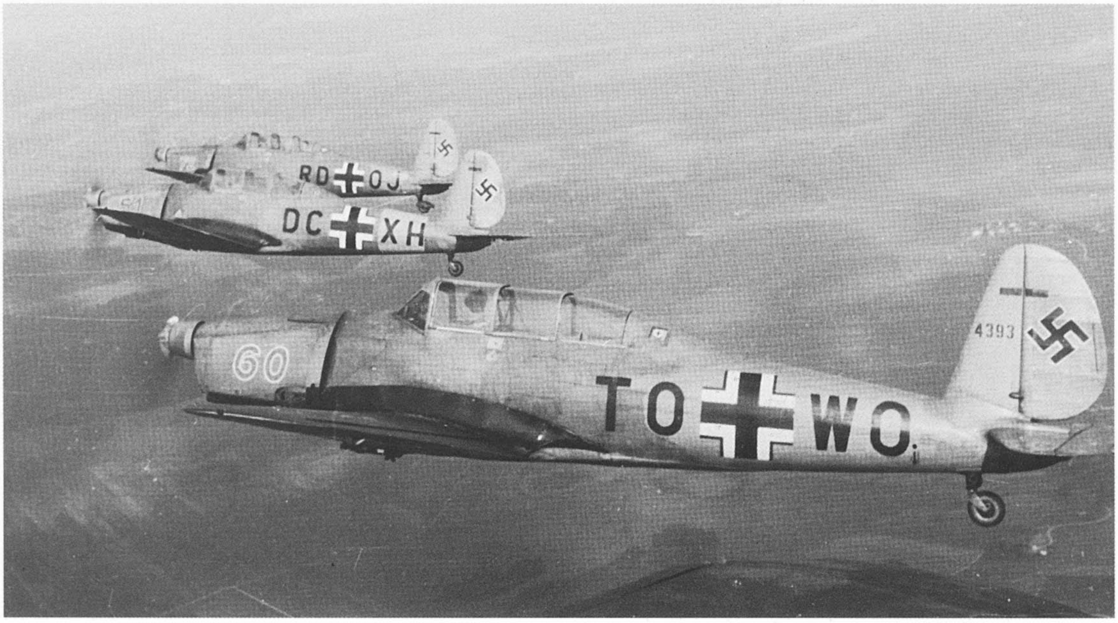
Arado Ar 96 B, GA+JV, provides off-duty amusement for the ground crews of the US 324th Fighter Group at Stuttgart-Echterdingen in June 1945. Despite the battered paintwork, the aircraft is probably in good condition, and the gantry in the background may mean that it has just had an engine change. W.Nr. 842 painted in yellow on the fin indicates that the aircraft was built in Czechoslovakia in 1943. Note the glossy finish of the letters compared to the standard camouflage paint.



Arado Ar 96 B, W.Nr. 1220 coded KE+MR, of FFS A/B 4, April 1943

This machine was camouflaged in the standard splinter pattern of RLM 70/71 with RLM 65 underneath. It operated with this training unit during April 1943.

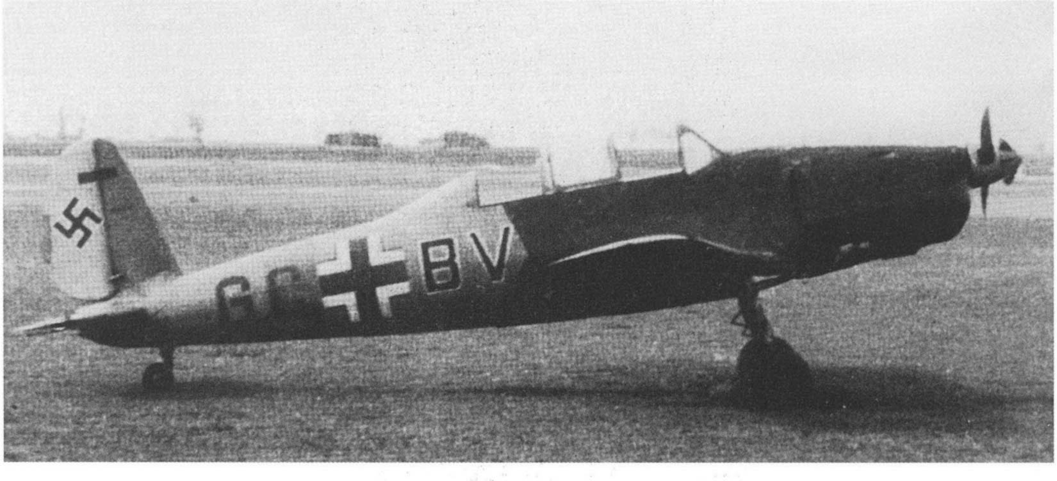


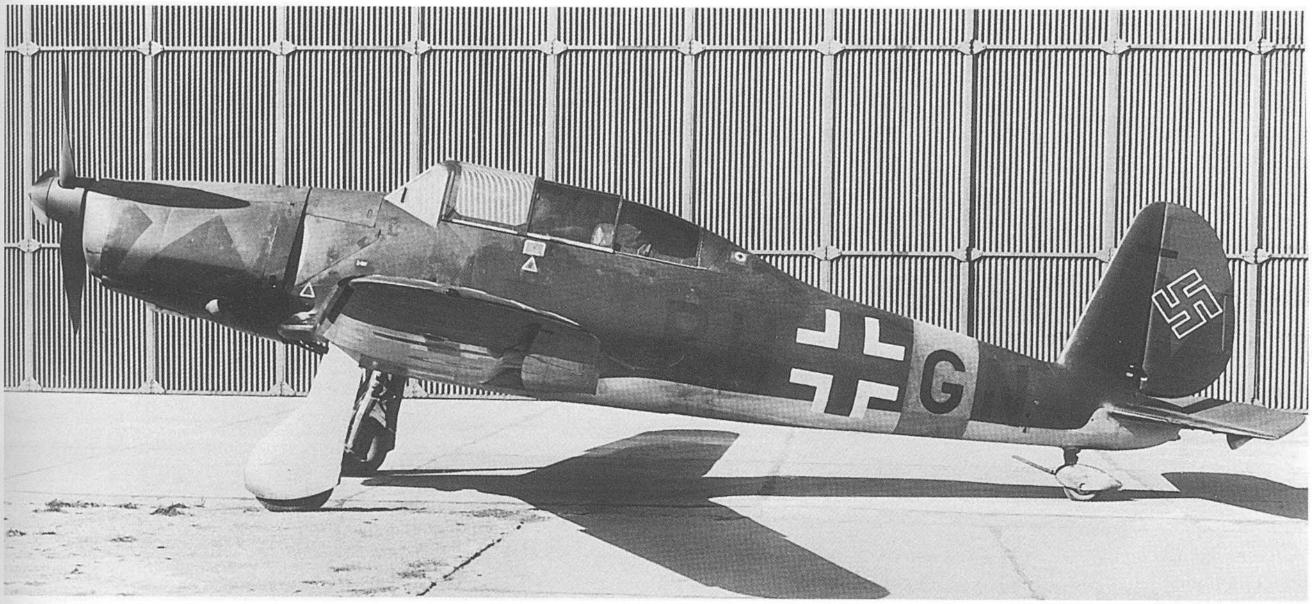


This Arado Ar 96 B-2 coded TO+WO, W.Nr. 4393, 'Red 60' of an unidentified training unit, has been fitted with an MG 17, calibre 7.92 mm machine gun together with a fitted synchronised camera gun to monitor the gunnery proficiency of the student pilot.

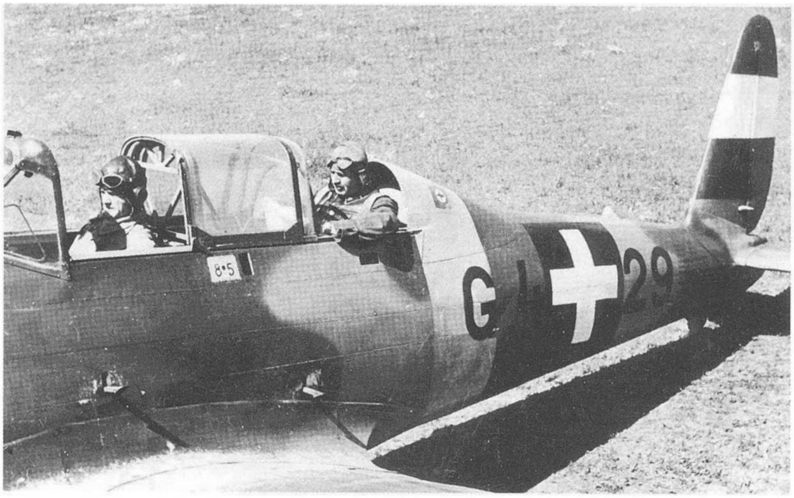
In-flight photographs of 'Red 60' with 'Red 51' coded DC+XH and 'Red 72' RD+OJ. The fuselages of all the machines appear to be painted in RLM Grey 02 with the red numbers on the nose outlined in white, with the middle machine having a wide yellow rear fuselage band. Note that they are all flying solo which would indicate that they are nearing the end of their training.

RIGHT: This Ar 96 B coded GC+BV carries a strange colour scheme, with the area forward of the second seat painted black ,as are the undersurfaces, and the remainder of the aircraft retaining its original RLM Grey 02 colour. In addition, the rudder appears to be yellow as is the fuselage band around the Balkenkreuz. The letters are black with 'BV' outlined in white. It would appear that the machine could have been used for night-fighter training.

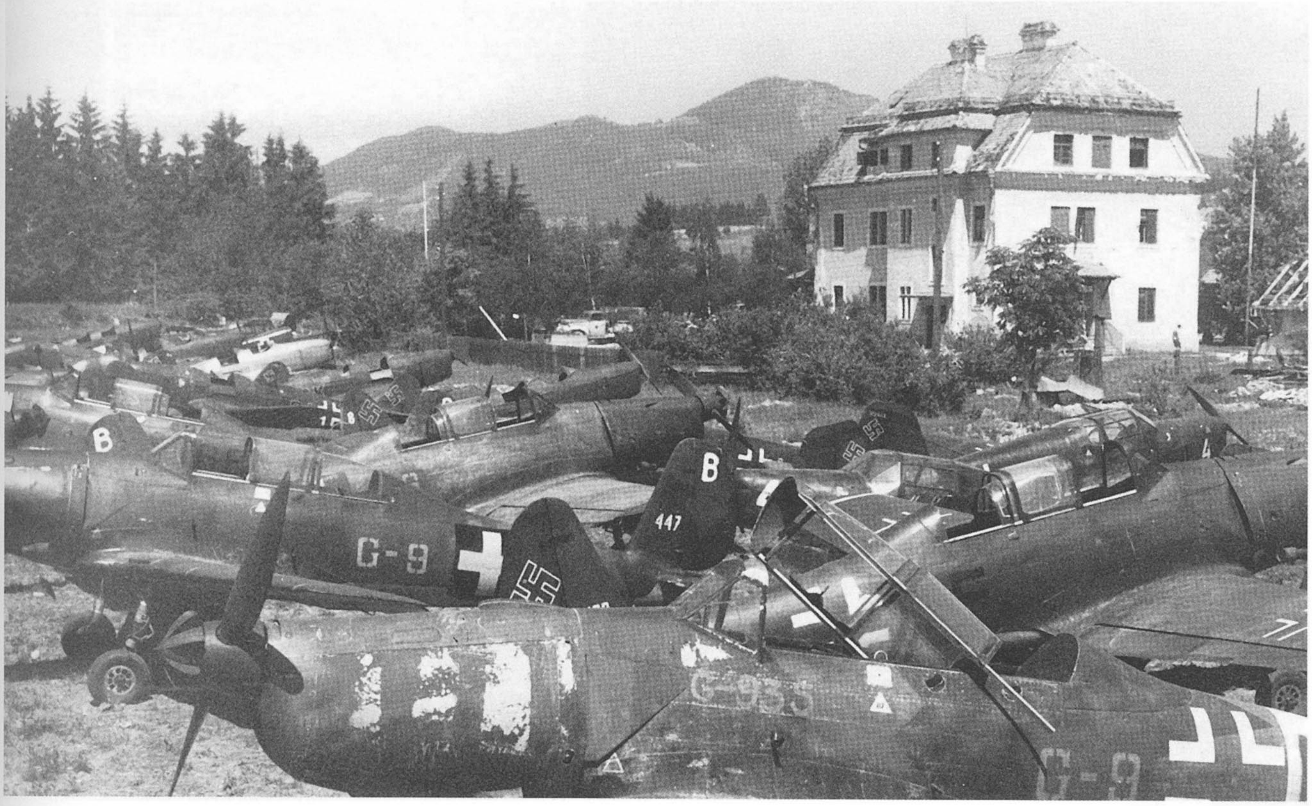




Seen outside a hangar at Prague-Letnany, this Czech-built Arado Ar 96 B variant, PH+GN, W.Nr. 4540 wears a typical RLM 70/71 green splinter finish with a factory-applied yellow fuselage band. The underside of the outer edges of the wings and underside of the engine cowling have been painted black. This particular machine was used for night flight training which is why the rear cockpit canopy has been covered with tinted plexi-glass.



A close view of the cockpit section of an Arado Ar 96 A in Hungarian markings in 1942. Note the fold-down footsteps and the marking for the first aid kit just behind the rear cockpit.



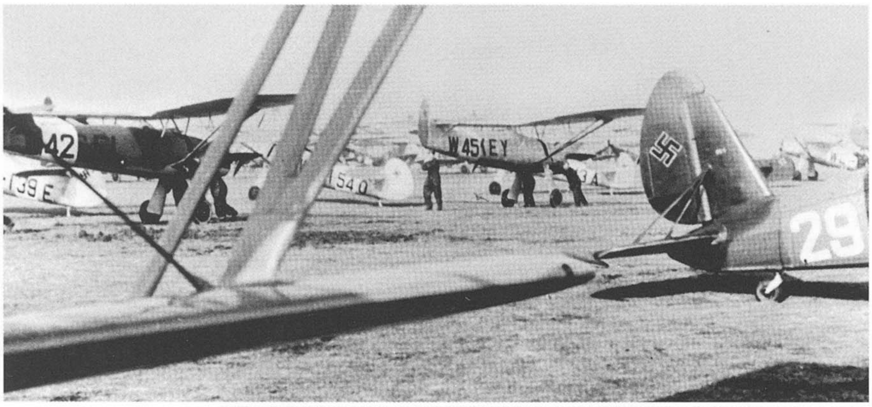
These Arado 96 A variants in both Luftwaffe and Hungarian air force markings lie abandoned at Klagenfurt in Austria at the end of the war. Just visible in the background are a group of Klemm 35s, one still in silver finish and another in Croatian markings.

Focke-Wulf Fw 56 *Stösser* (Falcon)

Winner of the 1934 RLM competition for a 'home-defence fighter', the agile little Fw 56 was the first design for the Focke-Wulf Flugzeugbau which was totally supervised by the talented Kurt Tank. First flown in November 1933, the incorrectly registered prototype, D-JSOT, was a neat parasol monoplane, not dissimilar to the competing Ar 76. Considerable attention was paid to aerodynamic cleanliness in order to squeeze maximum performance out of the 240 hp Argus As 10 C engine with which it was powered. Entirely conventional in structure, with a steel-tube fuselage covered by fabric and a similarly covered wooden wing, the design was steadily refined through the next four prototypes, V2-V5. An abbreviated faired-in fin and curved rudder gave a clue to the Albatros ancestry of the type. (Albatros and Focke-Wulf had merged in 1931). During testing, several problems were encountered with the undercarriage and strength of the wing. These were eventually resolved and led to the distinctive backward-raked single-strut undercarriage legs and an amazing diving ability. Ultimately, the final competition was held in summer 1935 where the Fw 56, in the shape of the V6, alias A-03, D-IXYO, was judged to be the winner. Neither as aerobatic nor as fast as the Ar 76 or the He 74, the *Stösser* won on account of its strength and handling, which were similar to the new monoplane fighters such as the Messerschmitt Bf 109.

Ordered into production as the Fw 56 A-1, the machine entered service with the *Luftwaffe* fighter schools fitted with one or two MG 17 machine guns. When in service with the NSFK, no armament was fitted. As befits an advanced fighter-trainer, until mastered it could be something of a handful for trainee pilots, but when in the hands of a skilled pilot it was a delightful machine. By the time production ended in 1938, 520 examples had been built. The Fw 56 saw extensive service with both the fighter schools and a number of experimental establishments, where it was instrumental in the development of the *Mistel* (Mistletoe) piggy-back concept.

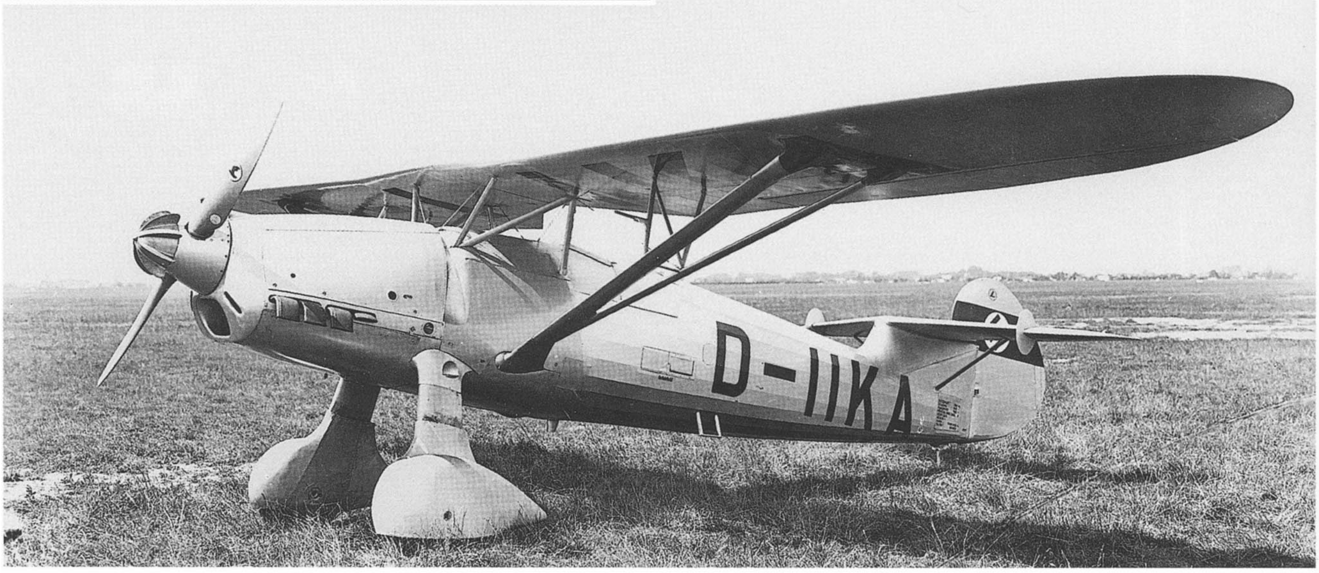
In 1937, export orders for the Fw 56 were permitted and the result was a small batch of 12 for the Austrian *Luftstreitkräfte*. It was not long, however, before these were in service with the *Luftwaffe* following the *Anschluss* (Annexation) in March 1938. The Hungarians were also attracted by the *Stösser* and purchased 32 examples between 1937-39.



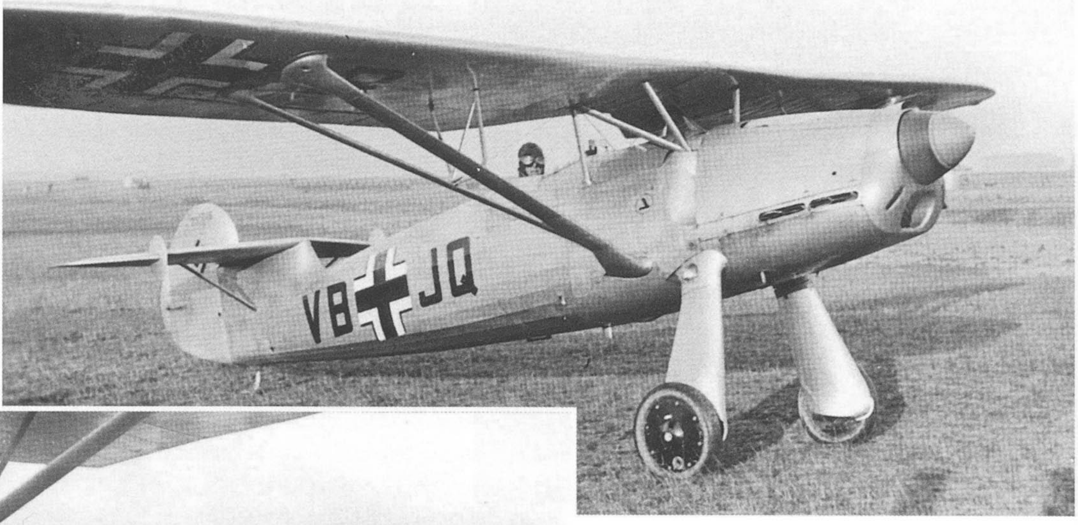
Fw 56 fighter-trainers from JFS 1 at Werneuchen, probably sometime in 1939. The tail and wing in the foreground belong to Arado Ar 68s of the same unit. The quasi-civil WL- letter codes have been overpainted by a series of numbers on coloured bands. Every aircraft on the base would have received an individual number, and it seems that the Fw 56s had a yellow (or possibly white) band with black numbers, while the Ar 68s used a red band with white numbers. This system did not necessarily apply to other units.

Specification

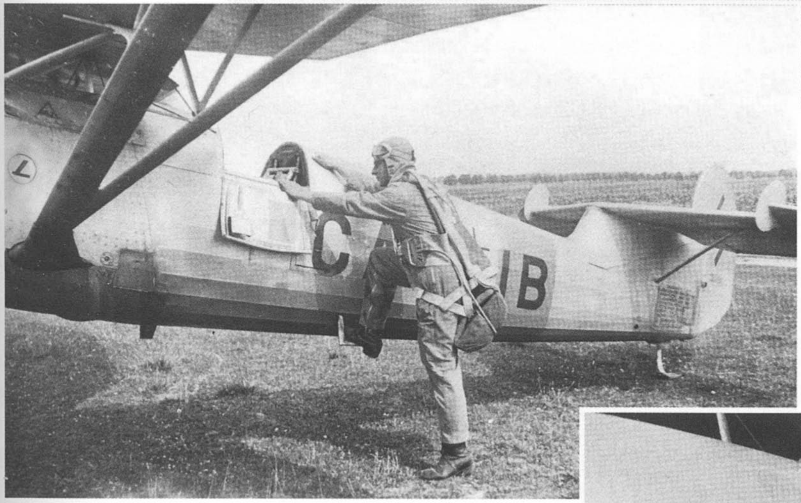
Span:	10.50 m (34 ft 5½ in)
Length:	7.60 m (25 ft 3¼ in)
Loaded weight:	996 kg (2,196 lb)
Max speed:	278 km/h (173 mph)



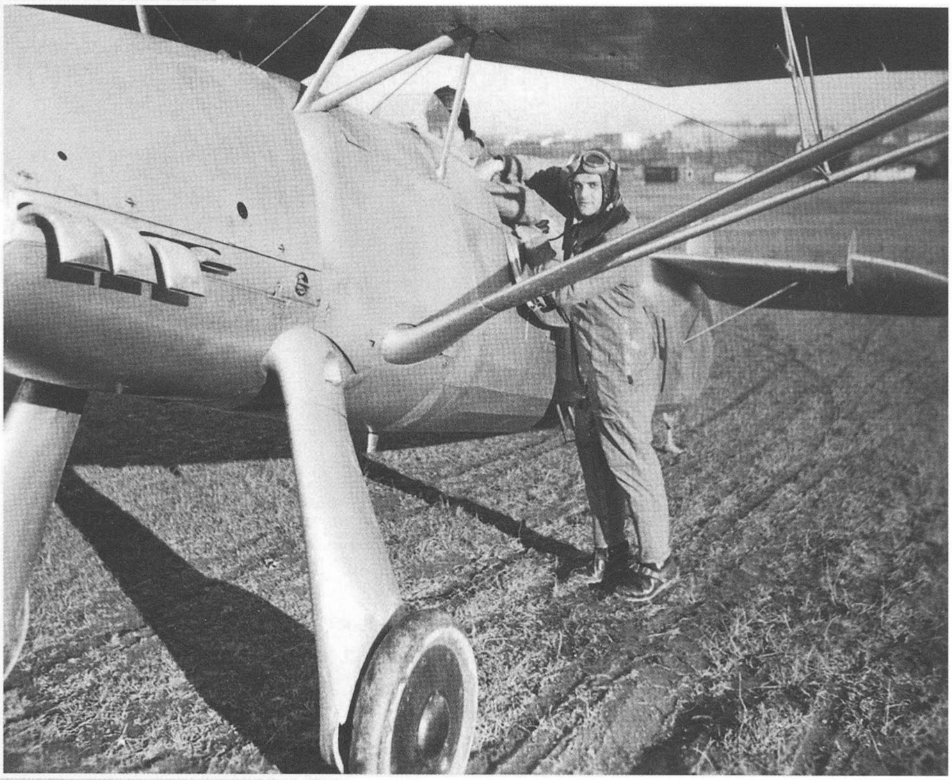
Built in January 1934, D-IIKA, the second prototype Fw 56, looks like an advanced racing aircraft in this view. Production aircraft differed primarily in a redesigned undercarriage to avoid infringing French Messier patents, and the deletion of the vaned spinner, which, however, made a reappearance on the Fw 189.



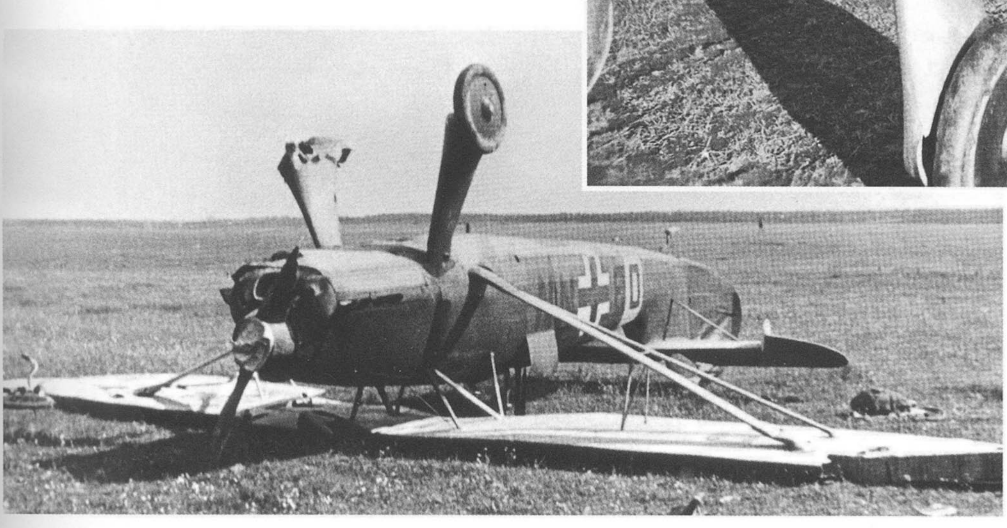
Focke-Wulf Fw 56 coded VB+JQ, taxies in after a flight from an unidentified grass airfield. Note the silver finish and the way the W.Nr. 2315, on the rudder is divided by the Focke-Wulf company logo. Probably seen at Pilsen, Czechoslovakia.



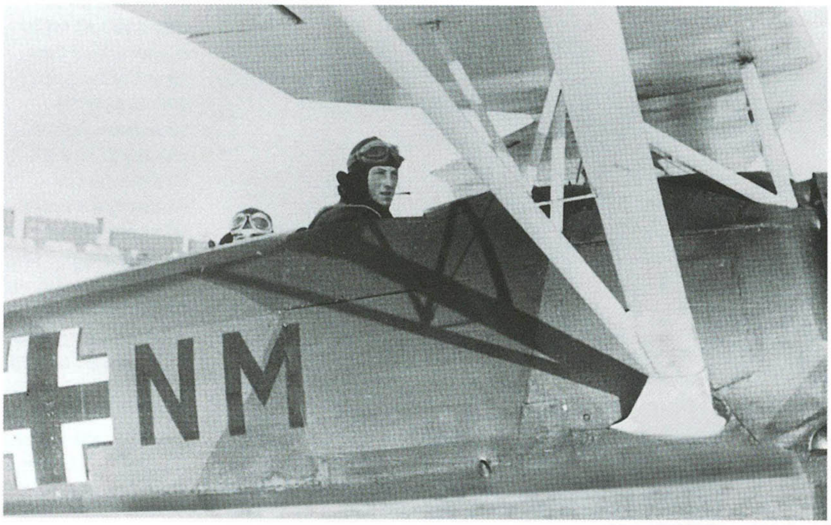
Student pilot Reum climbs aboard a Fw 56 coded CA+IB for a high altitude flight to 4,000 m. The overall grey finish shows numerous details, including the yellow fuselage band, the Focke-Wulf company logo just above the strut root, details of the hinged access hatch and the data table below the tailplane. This identifies the machine as belonging to LKS 2 based at Berlin-Gatow, but the aircraft had earlier served with Sch/FAR 53 from April 1939 and also A/B 122 in April 1941. (AMC)



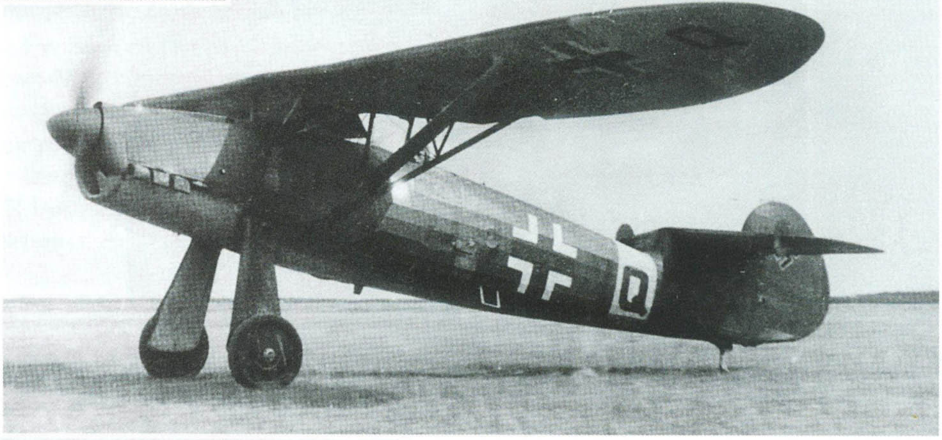
This view of a standard production aircraft shows the different undercarriage to that of the prototypes. Photograph possibly taken at Bad Aibling or Wels.



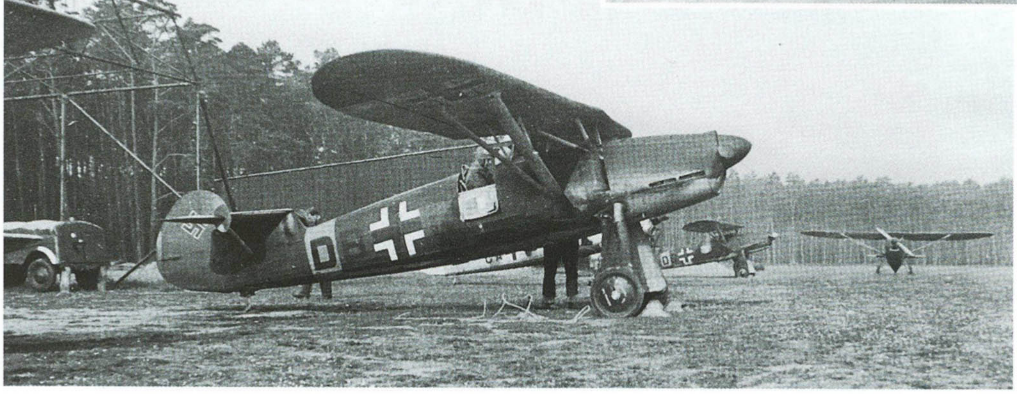
Focke-Wulf Fw 56, DB+NN, of LKS 2, rather the worse for wear after a landing accident, probably a ground loop. The rugged construction of the aircraft probably saved the pilot from injury – note the unused parachute on the ground. (AMC)



Closeup of the cockpit area of a Focke-Wulf Fw 56 fighter-trainer, coded PF+NM. Note how the underwing code letters have been painted over the wing support struts and the hasty manner in which the green camouflage paint has been brushed on. Location is unknown, but Fw 56 PF+NN served with FFS A/B 6 in January 1940 and this unit later became A/B 52, being based throughout at Danzig-Langfuhr.



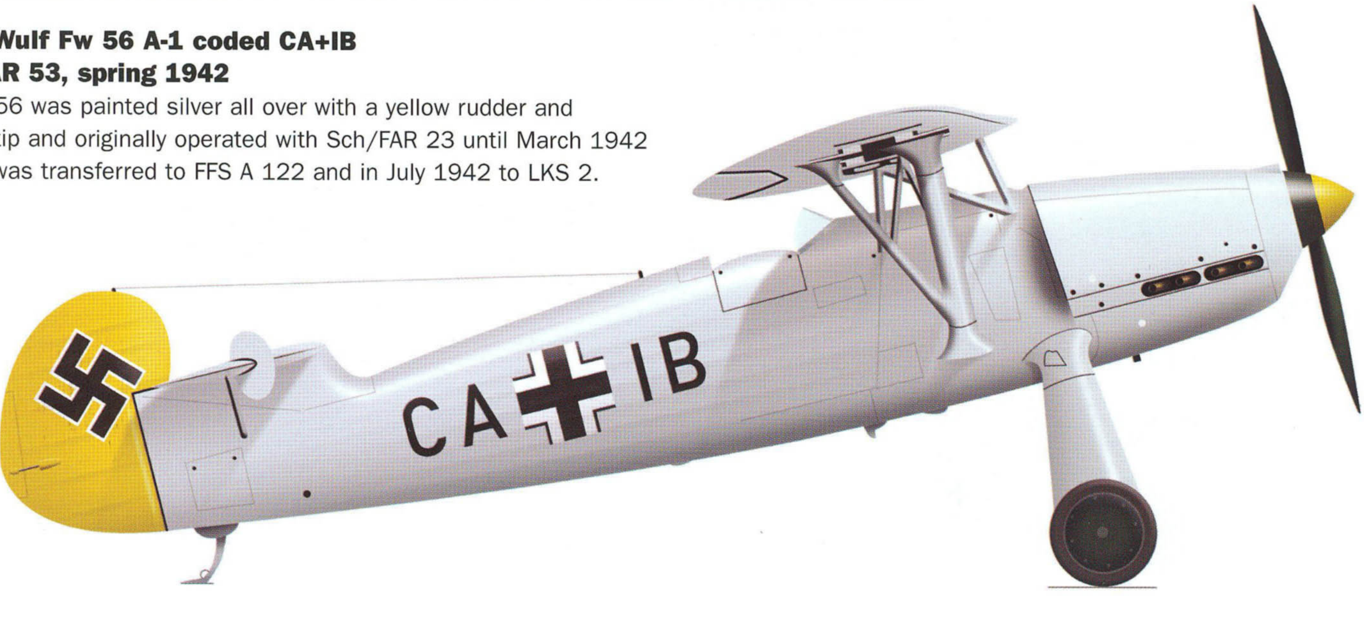
Good view of dark green camouflaged Fw 56 coded DB+NQ, probably at one of the outstations of LKS 2 at Berlin-Gatow in 1943, as it taxies across the field. Note that the aircraft has yellow wing tips outboard of the crosses as well as a yellow fuselage band, both indicative of friendly aircraft on the Eastern Front.



Focke-Wulf Fw 56s on the flight line. Nearest is overall dark green DB+N?, which has a yellow fuselage band and lower wingtips. Note the lowered access flap and the student pilot going through his pre-flight cockpit checks. Next is an overall grey example, CA+??, and further back still another green aircraft, DB+??. The unit is LKS 2 at Güterfelde or Reinsdorf in 1942-43.

Focke-Wulf Fw 56 A-1 coded CA+IB
Sch/FAR 53, spring 1942

This Fw 56 was painted silver all over with a yellow rudder and spinner tip and originally operated with Sch/FAR 23 until March 1942 when it was transferred to FFS A 122 and in July 1942 to LKS 2.



Gotha Go 145

First design of the Gothaer Waggonfabrik AG following its resurrection in 1933, the Go 145 was a contemporary of the several other primary training biplanes of the new *Luftwaffe*. Designed by Dipl.-Ing. Albert Kalkert, the Go 145 followed standard practice of the time by being an open-cockpit two-seat biplane of wood and fabric construction with the customary 240 hp Argus As 10 C inverted-vee engine. The fixed undercarriage and two-bladed propeller were also standard features of the period. One little-known feature, however, did set the Go 145 apart from other trainers – namely that with the exception of the Go 145, student pilots sat in the rear cockpit.

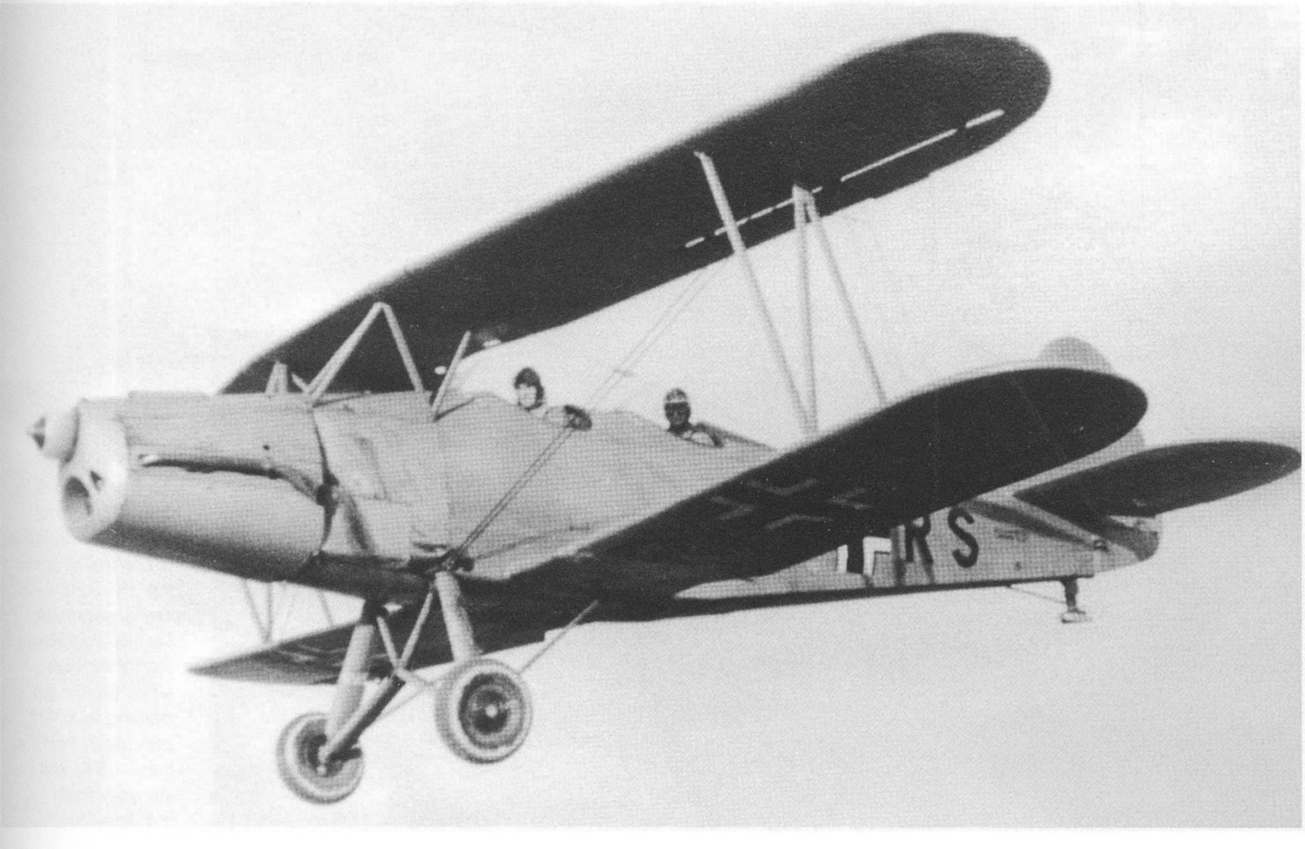
Following the first flight of the prototype in February 1934, orders were placed for the Go 145 A production version. These rapidly established a reputation for durability and pleasant handling and soon equipped almost half the A/B schools. Throughout the war, demand for the type was so great that it was also built by AGO, Focke-Wulf and BFW. 1,161 were built in Germany, others were licence-built by CASA in Spain, and Demag in Turkey also produced 43 for service in its own air forces. The Spanish versions remained in service until long after the war.

An experimental version with enclosed canopies known as the Go 145 B appeared in 1935 but did not enter service, while another, the Go 145 C, with an MG 15 gun in the rear cockpit, was used in small numbers for gunnery training.

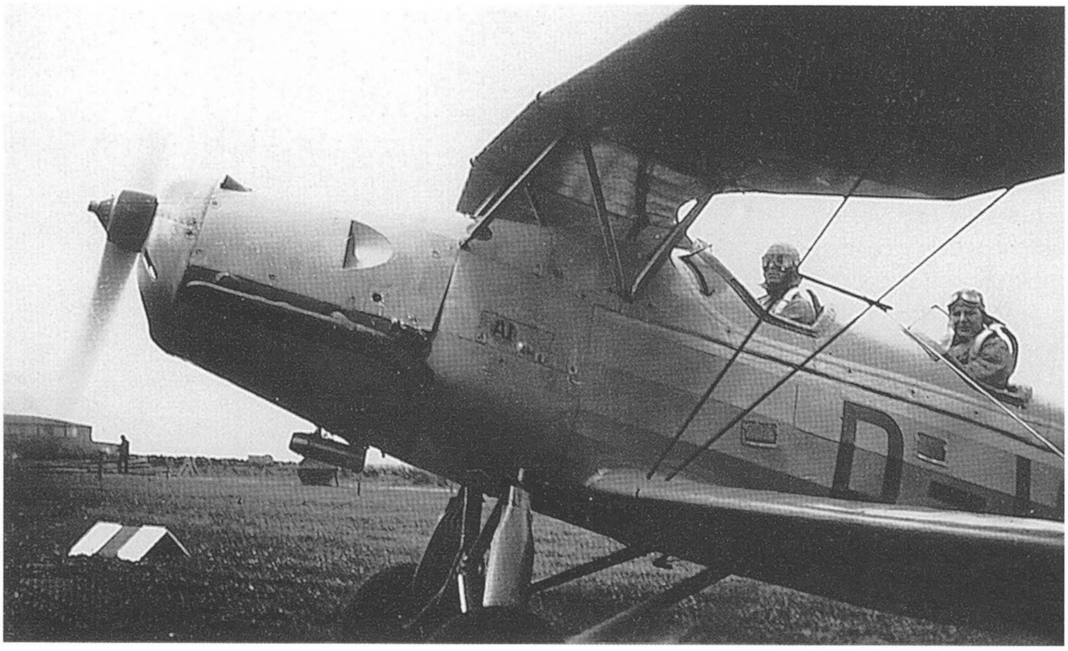
After the arrival in force of Soviet night-harassing biplanes during 1942, the Go 145 was chosen, in concert with the Ar 66, to be the main equipment of the German counter-squadrons. Hundreds of Go 145s fitted with a selection of guns, bombs, loudspeakers or even rockets roamed over the entire Eastern Front at night. The outdated biplanes proved to be so successful in the hands of the 13 *Störkampfstaffeln* that by October 1943 they were re-designated as *Nachtschlachtgeschwader* and many were still in front-line service in May 1945.

Although the activities of the Go 145 have gone largely unrecorded, the type did much to establish Gotha as one of the foremost German builders of wooden aircraft, which culminated in it producing the futuristic Horten Ho 229 flying wing jet fighter-bomber in 1945.

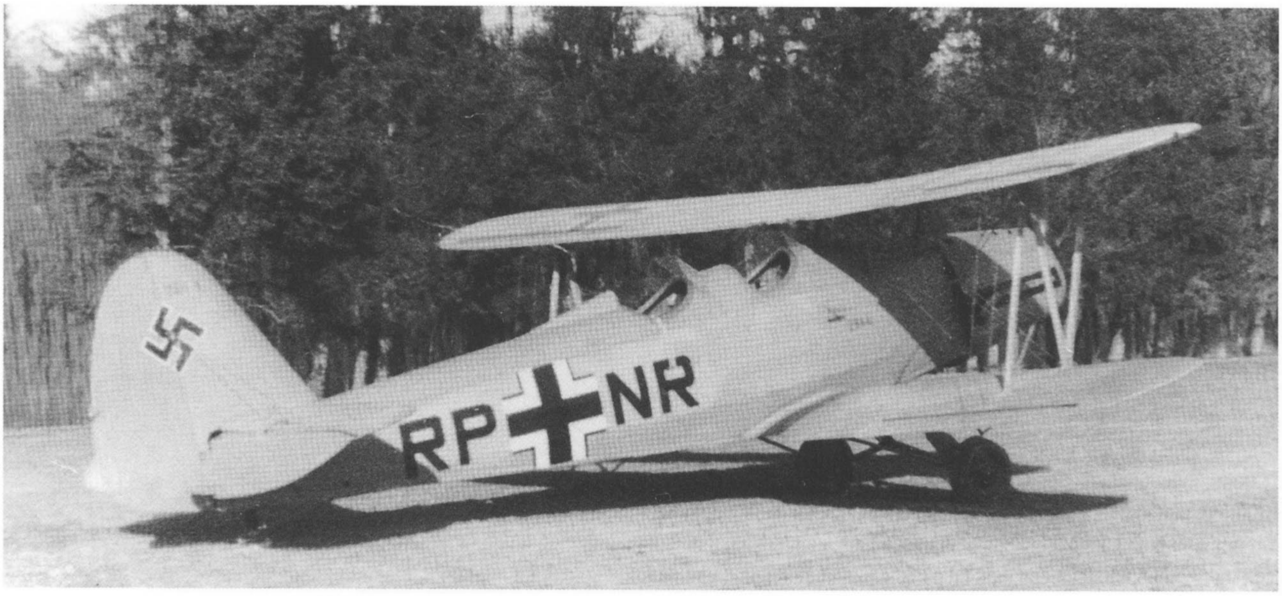
Specification	
Span:	9.00 m (29 ft 6$^1/_4$ in)
Length:	8.70 m (28 ft 6$^1/_2$ in)
Loaded weight:	1,380 kg (3,043 lb)
Max speed:	212 km/h (132 mph)



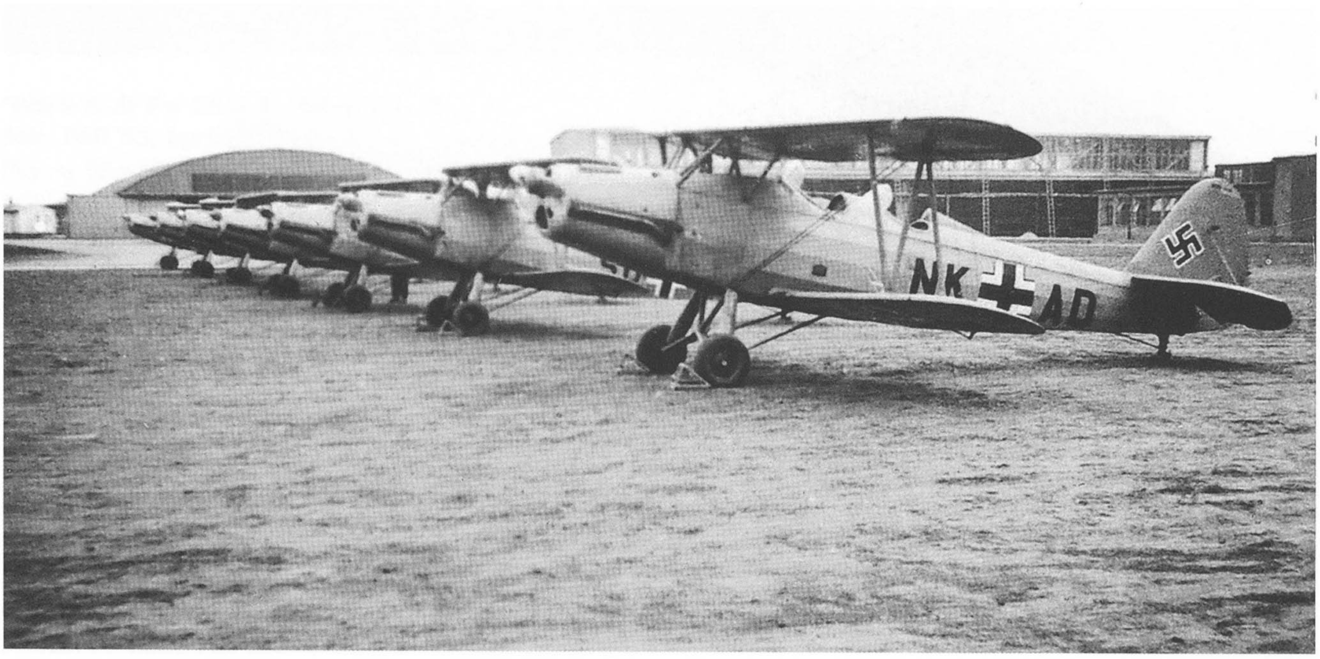
A Gotha Go 145, ??+RS, in flight with student and instructor. The unit and location are unknown.



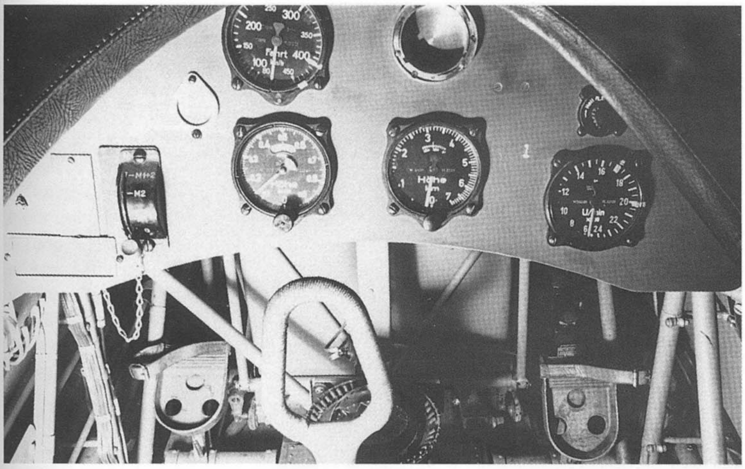
A Gotha Go 145 belonging to FFS Perleberg, 1935-36.



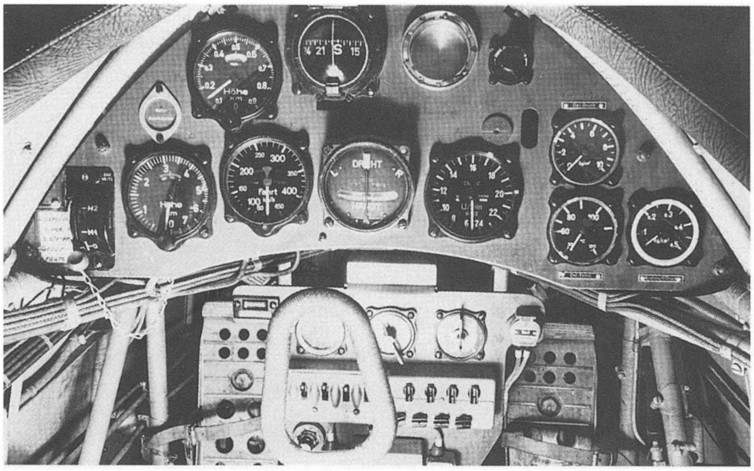
Gotha Go 145 coded RP+NR, W.Nr. 2866, waits for its pilot. This machine is probably from Sch/FAR 33, based at Elbing in mid-1940.



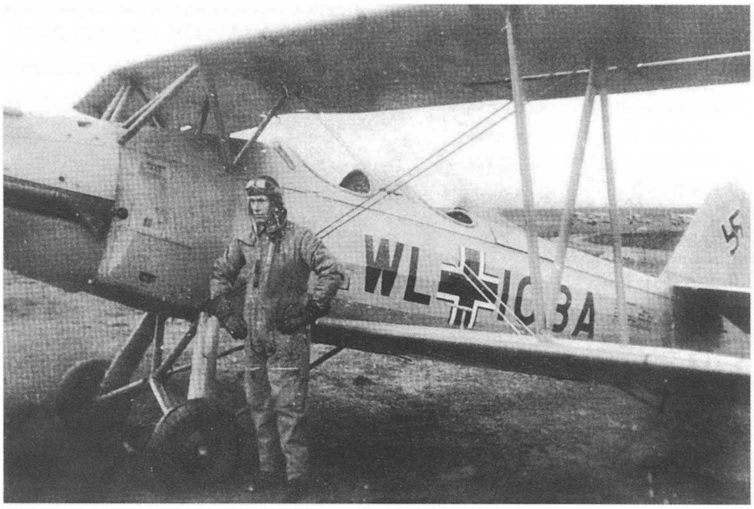
The Gotha Go 145 is one of the most anonymous aircraft in the Luftwaffe, as this line-up shows. All in overall grey finish, the nearest machine carries the code NK+AD, whilst the next has an SD+?? code. Apart from that, the unit, time and location remain unknown.



The rear cockpit of a Go 145. Contrary to most other Luftwaffe trainers, this was the instructor's usual place, as it was in the RAF. However, as most Luftwaffe primary and basic trainers were not fitted with an intercom system, they relied largely upon hand signals and pressure on the control column by the instructor. As a result it made more sense for him to be in the front cockpit where he was visible to the pupil. How well the Go 145 worked in this system is not known, although could the strange device on the top right (seen in both cockpits) be a form of intercom?

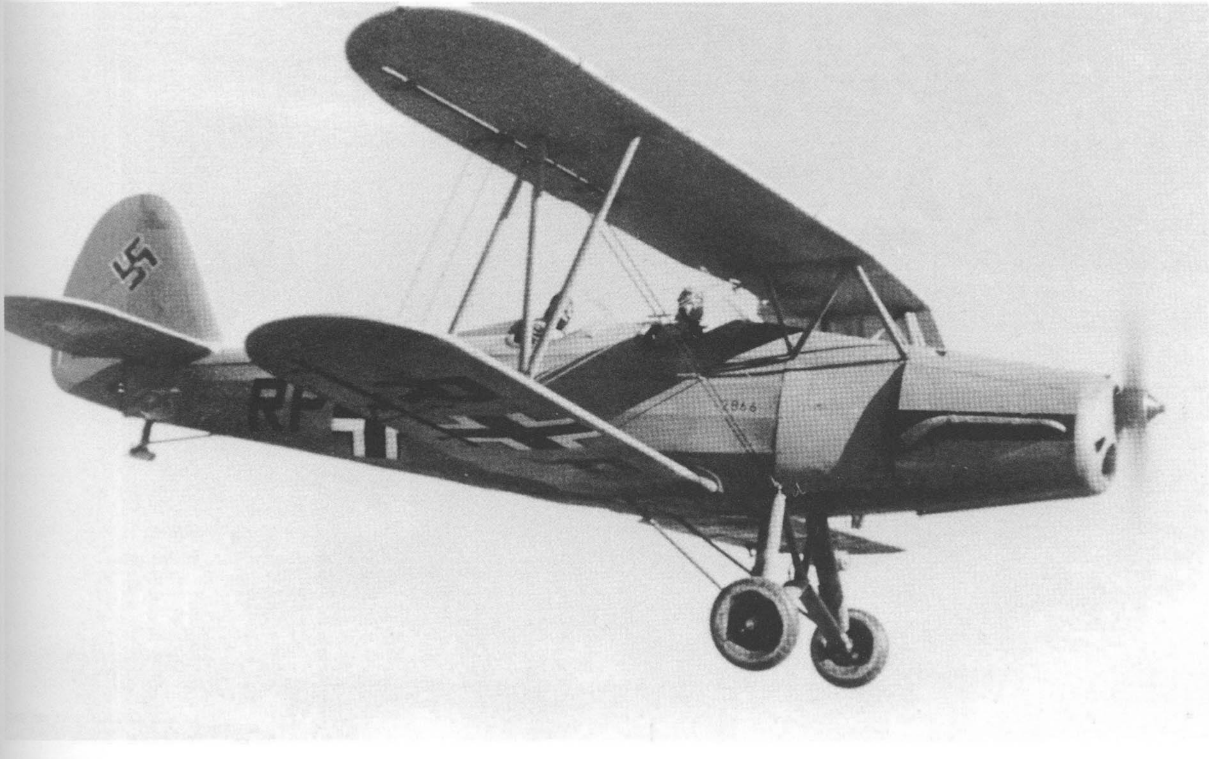


The bewildering array of instruments faced by the trainee in the front cockpit of the Go 145, although this instrumentation would indicate a more advanced trainer.

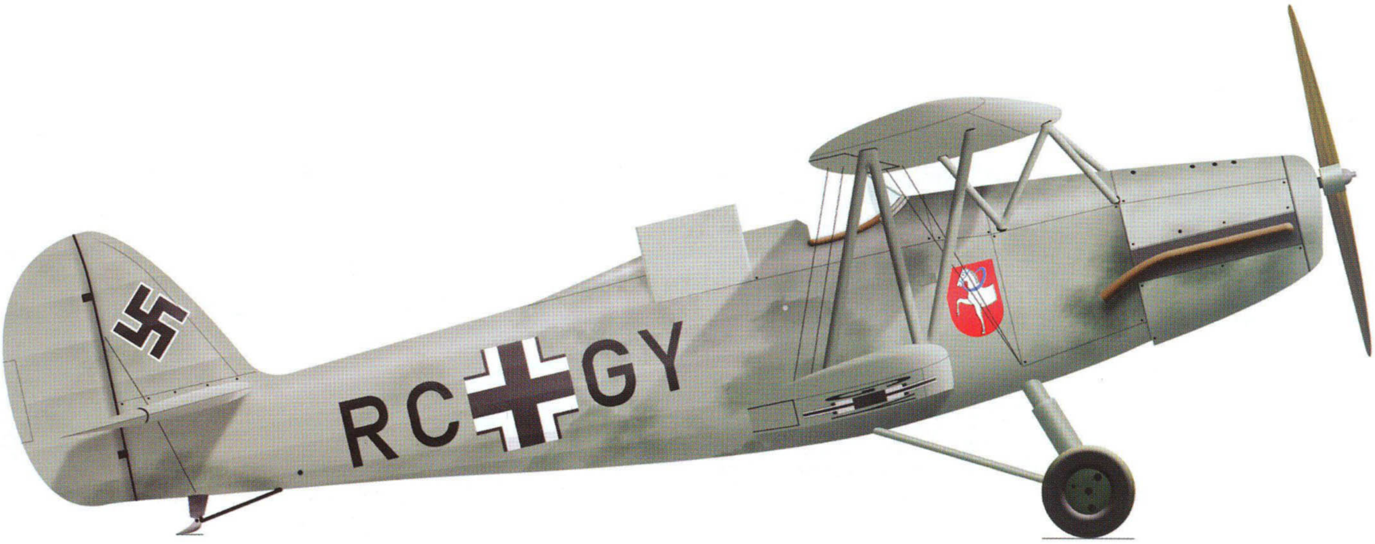


LEFT: A blurred photograph of a Gotha 145 fitted with skis in the winter of 1940 during training for the B1 licence at A/B 23 at Kaufbeuren.

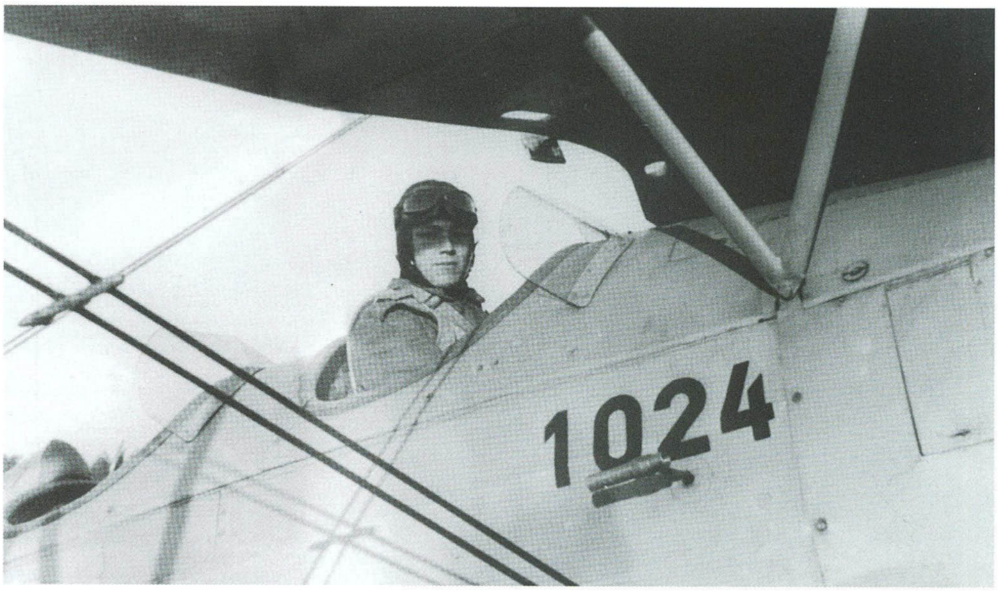
ABOVE: Future Me 262 ace Hermann Buchner as a flying instructor in front of Go 145 WL+IOBA of Sch/FAR 22 at Neustadt-Glewe in March 1940. Finished in RLM 02 overall the aircraft wears the interim military markings, which were superseded by four-letter codes.



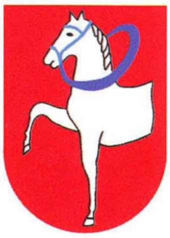
Overall RLM Grau 02 Gotha Go 145 coded RP+NR, belonging to the flying school attached to FAR (Fliegerausbildung Regiment 33) based at Elbing, mid-1940. Note the unusual position of the Werknummer 2866 below the front cockpit. (AMC)



Gotha Go 145 coded RC+GY of FFS A/B 32
This aircraft operated with FFS A/B 32 and was painted overall in RLM Grey 02. The modification over the rear seat was for blind-flying and instrument training purposes.



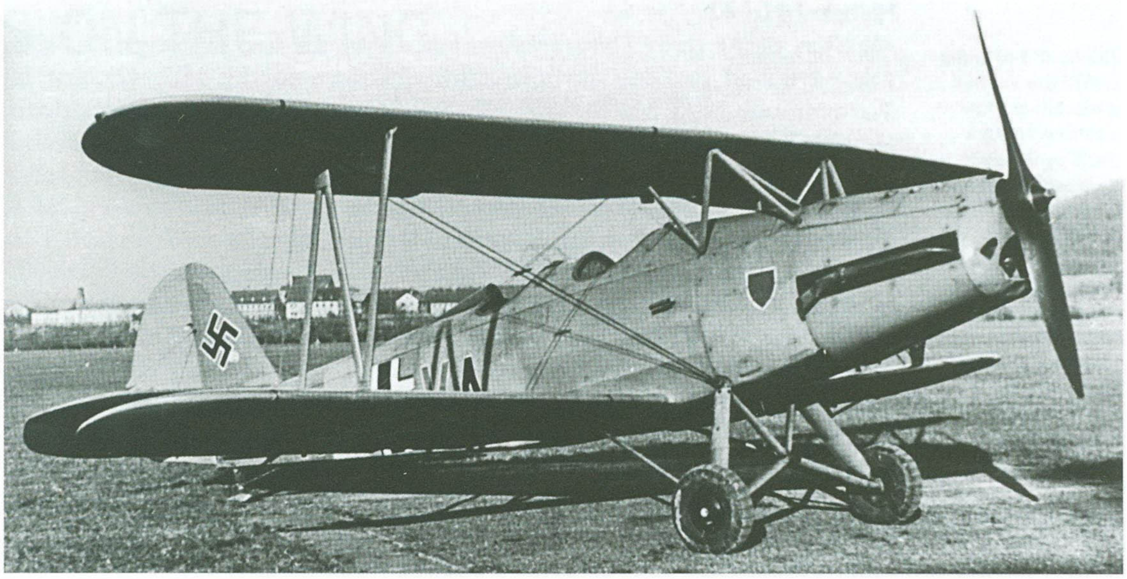
Another future ace, this time night fighter expert Martin Drewes, as a pupil showing the view available from the front cockpit of a Go 145, here W.Nr. 1024.

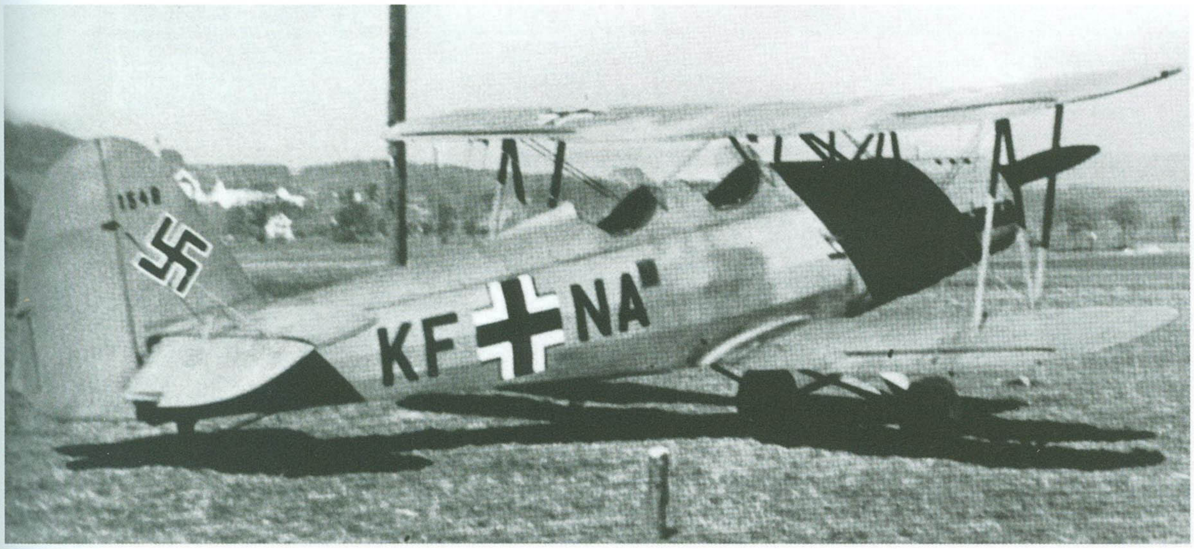


FFS A/B 32 Badge

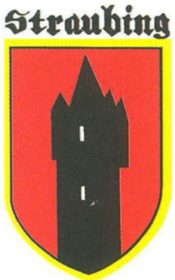
A group of trainees in winter fur-lined flying suits, among them Günther Loidl, later a pilot with SKG 10 in front of a Go 145 of A/B 23 at Kaufbeuren in 1940.

This Gotha Go 145 W.Nr. 1455, coded H4+VA belonged to FFS A/B 121, and was flown by Erwin Lange. He had taken off at Langengebach airfield near Frankfurt for a practice flight and was briefed to fly to Freiburg im Breisgau. Unfortunately he ran out of fuel and landed at Basle-Birsfelden airfield in Switzerland on 30 November 1941 at 11.35 hours. Lange was arrested in a hotel at Basle but was allowed to return to Germany, taking off from Birsfelden on 2 December 1941 after the Swiss authorities had supplied his aircraft with 50 litres of fuel. According to Swiss information Lange flew to Freiburg im Breisgau. (Hans-Heiri Stapfer)

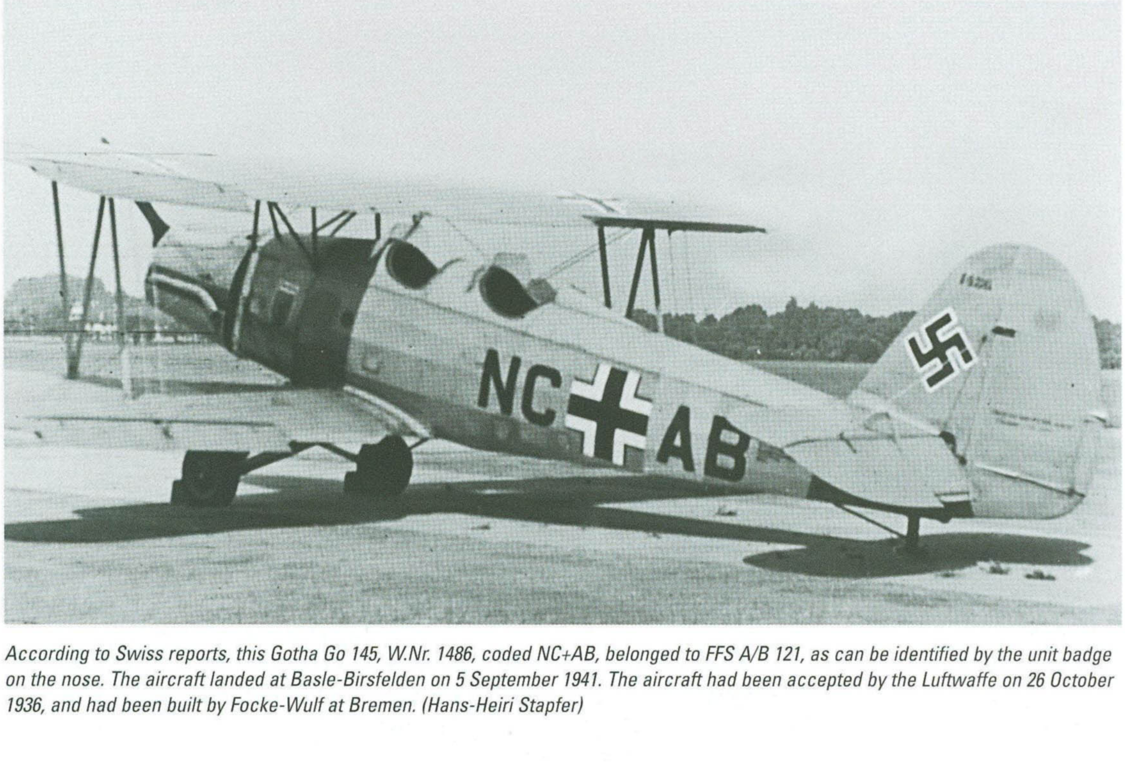




LEFT: This Gotha Go 145, W.Nr. 1548, coded KF+NA, belonging to FFS A-B 112 was piloted by twenty-year-old Gefreiter Friedrich Knoll, who on 18 March 1941 lost his orientation over Freudenstadt. He was on a practice flight from Giebelstadt to Freiburg im Breisgau in Southern Germany, when he ran out of fuel, due to a leaking fuel tank. He managed to land at Kleindöttingen in Switzerland. (Hans-Heiri Stapfer)



FFS A/B 4 Badge

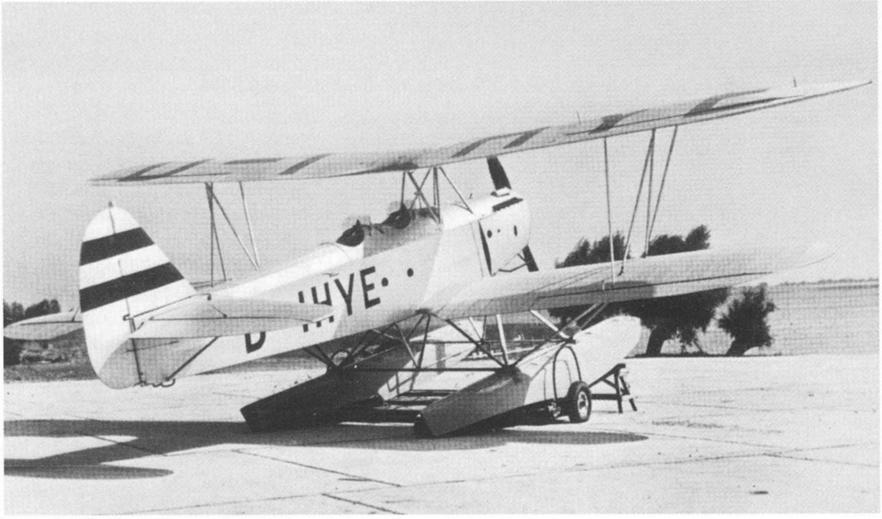


According to Swiss reports, this Gotha Go 145, W.Nr. 1486, coded NC+AB, belonged to FFS A/B 121, as can be identified by the unit badge on the nose. The aircraft landed at Basle-Birsfelden on 5 September 1941. The aircraft had been accepted by the Luftwaffe on 26 October 1936, and had been built by Focke-Wulf at Bremen. (Hans-Heiri Stapfer)

This He 42 B-03 coded D-IHYE was the third production machine of a batch of ten from the 'B' series which were powered by a Junkers L-5-G engine. The ten aircraft were given the following civil codes starting with the 'B-01', D-IMYR, D-ITNA, D-IHYE (as shown on photograph) D-IBBD, D-IJNE, D-IBOU, D-IDKJ, D-IFMF, D-IFOG and D-IDUL..

Heinkel He 42

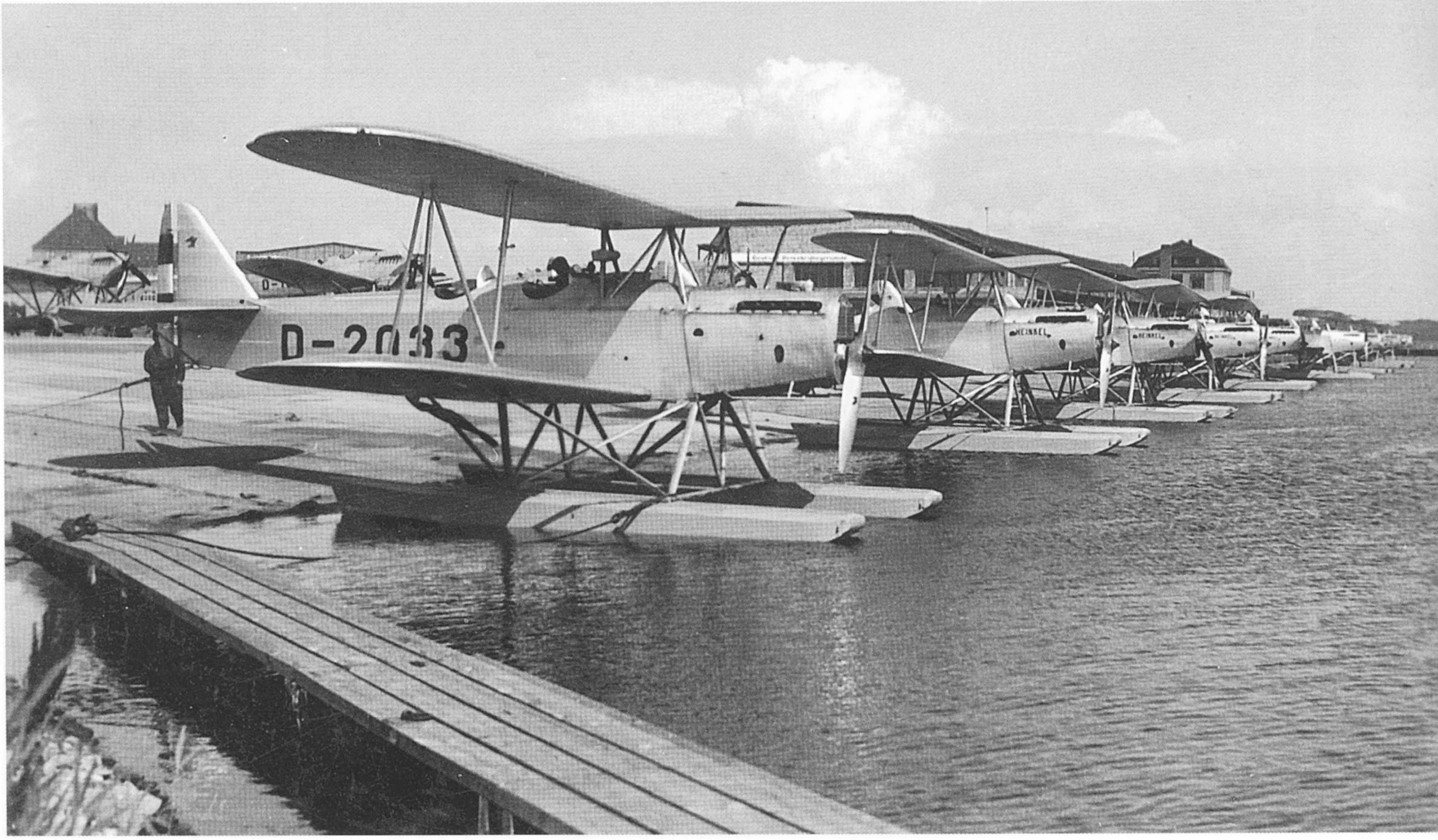
Mainstay of the three *Flugzeugführerschulen (See)*, the first prototype, W.Nr. 333, of this robust single-engined two-seat floatplane (then known as the HD 42) first left the water off Warnemünde on 3 March 1931. An entirely conventional fabric-covered biplane based on Heinkel's extensive experience with marine aircraft, the prototype proved to require little modification and a first batch of 32, known as the He 42A, was completed in 1932. Powered by the uncommon Junkers L 5 300 hp engine, experience with these led to a new version, the He 42 B-0, which used a more powerful Junkers L 5 G engine. Two of the ten B-0 versions built were modified by Heinkel as part of a programme of strengthening to suit the machines for catapult launching. Additionally fitted with new radio, these modified B-0s became the first of 36 B-1s intended for sea reconnaissance. Incorporating various further minor improvements, the final versions, the He 42 C-1 and C-2, differed mainly in the provision of a single machine gun for the C-2 to better fit it for overwater reconnaissance. The C-1 was a dedicated unarmed trainer with a slightly less powerful engine. Both types survived as trainers until about 1944. A total of 194 He 42s were built at the Rostock factory.



Specification

Span:	14.00 m (45 ft 11 in)
Length:	10.60 m (34 ft 10 in)
Loaded weight:	2,420 kg (5,336 lb)
Max speed:	200 km/h (124 mph)

BELOW: A line of Heinkel He 42 B training floatplanes drawn up on the slipway at Warnemünde, probably being used by the marine flying school based there. D-2033, W.Nr. 373, the nearest machine, was first registered i April 1931 to the DVS, one of the many cover organisations used in the establishment of the clandestine Luftwaffe. Several survived until 1944. This machine certainly survived until at least 1934. Note the small winged 'H' Heinkel trademark on the fin. (AMC)



EAGLES ON THE WING

Training by Combat – the fighter pilots

When World War II began, the *Luftwaffe* possessed a sizeable number of fully trained and efficient aircrew. Despite the loss of such men during the campaigns in Scandinavia, France and the Low Countries, and the even more grievous losses during the Battle of Britain, there was still a sufficient reservoir of crews to sustain operations without major difficulty. Within a year of the ill-judged invasion of Russia, however, this situation quickly changed and the number of trained crews leaving the schools began to be outstripped by the accelerating toll of casualties on the Eastern Front. The most serious shortages were in the ranks of the *Jagdflieger*, where experienced fighter pilots who had survived earlier campaigns were being lost at an alarming rate. Ultimately, the ramifications of the earlier negligence on the part of the *Luftwaffe* High Command concerning the training of fighter pilots were to be seen in the skies over the Reich itself, where progressively outnumbered German squadrons attempted to deflect the massive Allied aerial armadas.

Until 1942 *Luftwaffe* commanders had, deliberately or otherwise, been able to ignore the accumulating effects of operational demands upon the training system. By the summer of that year the consequences could no longer be denied and the first units to feel the contraction and deterioration in both the numbers and quality of trained pilots and crews were the fighter squadrons. As previously noted, under the existing system trainees received their basic military training at an FAR, potential NCO pilots and aircrew then passing through the A/B schools, outline details of which were given earlier. Officer candidates, for their part, attended a *Luftkriegsschule* for additional training in tactics, air force law, military discipline and regulations etc, as well as the basic flying skills. Brief histories of the LK schools, which brought the potential pilot officer up to 'B' Certificate level, can be found in Table 6.

Table 6: **Officer Training Schools – Luftkriegsschulen (LKS)**

School	Formed	Main Bases	Comments
LKS 1	January 1940	Dresden, Riesa-Leutewitz Kamenz	First formed as LKS Dresden, April 1936. Closed April 1945.
LKS 2	January 1940	Berlin-Gatow, Güterfelde, Reinsdorf	First formed as LKS Berlin-Gatow April 1936. Closed March 1945.
LKS 3	January 1940	Magdeburg Borkheide, Güterfelde	Formed April 1936 as LKS Werder (Havel). Merged with FFS A 61 at Oschatz June 1944. Closed April 1945.
LKS 4	January 1940	Fürstenfeldbruck, Königsberg	Formed October 1937 as LKS Fürstenfeldbruck. Closed April 1945, personnel assigned as ground troops in Graz.
LKS 5	January 1940	Breslau-Schöngarten	Formed April 1939 as LKS Breslau-Schöngarten. January 1945 many personnel became ground troops as *Kampfgruppe* LKS 5 on Eastern Front. Closed April 1945.
LKS 6	November 1939	Kitzingen	Flak training school. Personnel assigned to 17 *Panzer* Division April 1945.
LKS 7	1939	Tulln, Langenlebarn Budweis, Seyring	With A/B 112 from August 1940. Formed ground troops March 1945 to resist Russian advance on Vienna.
LKS 8	August 1941	Göppingen	Flak school. Closed April 1945.
LKS 9	July 1942	Tschenstochau, Werneck	Closed February 1945.
LKS 10	August 1944	Fürstenwalde/Spree	Formed from FFS B 10. To Straubing January 1945. Closed April 1945, personnel to 10 *Fallschirmjäger* Division.

Following the award of his pilot's badge, the trainee then joined one of the *Jagdfliegervorschulen* (JVS) for initial fighter training where he was allowed to fly various obsolete or foreign single-seat fighter aircraft. Prominent among these were such old-stagers as the Ar 68 and He 51 biplanes, early model Bf 109 and French Dewoitine D.520 monoplanes and assorted captured machines. Initial training was followed by more demanding aircraft and exercises at a *Jagdfliegerschule* (JFS).

Table 7: **Jagdfliegervorschulen (JVS)**

	Date Formed	Main Bases Used	Comments
JVS 1	1940	Kamenz/Saxony	Became JFS 6 November 1942.
JVS 2	1940	Lachen-Speyerdorf	3. *Staffel* to JFS 6, remainder to JFS 6 November 1942.
JVS 3	September 1941	Wien-Schwechat, Neubiberg	Became JFS 3, October 1942.

Jagdfliegervorschulen (JFS)

	Date Formed	Main Bases Used	Comments
JFS 1	November 1937	Werneuchen, Pau	1940 became JFS 1, then as I./JG 101, January 1943.
JFS 2	October 1933	Schleissheim	JFS 2 from 1939, I./JG 102 from January 1943.
JFS 3	September 1939	Stolp-Reitz, Grove, Bad Aibling	As JGr Drontheim June 1941-August 1942, then JFS 3. January 1943 as JG 103.
JFS 4	November 1939	Fürth	January 1943 as I./JG 104.
JFS 5	December 1939	Wien-Schwechat, Villacoublay, Guyancourt, Octeville	4. *Staffel* formed July 1941 as anti-shipping-*Jabo* training unit for JG 2 and JG 26. To JG 2 March 1942. Remainder as I./JG 105 from January 1943.
JFS 6	November 1942	Lachen-Speyerdorf, Eichborn	From JFVS 2. As I./JG 106 from January 1943.
JFS 7	October 1942	Nancy	From ZVS 1. As II./JG 108 from October 1944.
JGr Drontheim	April 1941	Drontheim	July 1941, 4. *Staffel* to Trondheim with Bf 109 T. June 1942 1., 2., and 3. *Staffeln* to JFS 3. July 1942, 5. *Staffel* to JFS 3 as Slovak training unit.

Eventually, the newly-fledged *Jagdflieger* was permitted to try out his skills in a fully operational aircraft when he was posted to the IV. *Gruppe* – the *Ergänzungsgruppe* (training group) – of his allotted *Geschwader*. The intention was to allow the new pilots time to gain precious operational experience before being hurled into the front line. Here, it should be noted, the unit was under the control of the local *Luftflotte* commander, who was frequently under considerable operational pressure to use whatever forces he had available. As a result, the trainee's stay in the IV. *Gruppe* was all too often quite brief.

At first, this system worked well enough, but the loss of so many experienced pilots meant that there was insufficient manpower to carry out the training function in the operational squadrons, which therefore became more and more abbreviated. Consequently, the result was the disbandment of the *Ergänzungsgruppen* attached to specific units in summer of 1942 and the formation of three Fighter Pools situated in the three main operational areas of the *Luftwaffe*, namely in the South at Cazaux in France (*Ergänzungs-Jagdgruppe Süd* – EJGr *Süd*); in the West (of Berlin), based at Mannheim, Germany (*Ergänzungs-Jagdgruppe West* – EJGr *West*) and in the East at Krakow in occupied Poland (*Ergänzungs-Jagdgruppe Ost* – EJGr *Ost*). In future, operational units were to draw their replacement crews from these pools. Although this reduced the number of instructors required, it also had the effect, however, of curtailing operational training of new pilots at the very time such experience was becoming vitally necessary to the newcomers. Equally seriously, the elimination of what was in effect a fully-crewed, albeit only part-trained reserve in the *Ergänzungsgruppen*, led to a dilution in front-line strength.

Another aspect of the changed situation was that from spring 1943, the specialised fighter and bomber training schools were put on a semi-operational footing, ceasing to be designated as fighter schools (JFS), but becoming *Jagdgeschwader* (JG), as in Table 8.

Table 8: **Luftwaffe Fighter Schools**

JFS	JG	Main Bases Used
JFS 1	JG 101	Werneuchen, Pau, Schongau
JFS 2	JG 102	Zerbst, Stolp-Reitz
JFS 3	JG 103	Bad Aibling, Chateauroux, Stolp-Reitz, Pütnitz
JFS 4	JG 104	Fürth/Roth
JFS 5	JG 105	Villacoublay, Chartres, Bourges, Guyancourt, Markersdorf
JFS 6	JG 106	Lachen-Speyerdorf, Reichenbach
JFS 7	JG 107 (I)	Fürth
JG 116	JG 107 (II)	Hildesheim
FFS A/B 62	JG 108	July 1943. Bad Vöslau
	JG 109	Stolp-Reitz
BFS 6	III./JG 110	Altenburg, Garz, Swinemünde
BFS 10	JG 110	Altenburg, Garz, Swinemünde
FFS B 13	JG 111	July-October 1944 at Roth. To JG 104.
	JG 112	July-October 1944 at Landau/Isar. Fighter conversion school for ex-bomber pilots. To JG 101.
III./ZG 101	JG 113	July-October 1944 at Laupheim. To JG 106.
	JG 114	September-October 1944 at Hadersleben. To JG 102.
FFS B 35	JG 115	July-October 1944 at Hagenow. To JG 107.
FFS B 37	JG 116	July-October 1944 at Hildesheim. To JG 107.
I./NAG 102	JG 117	July-October 1944 at Brieg. To JG 105.

There were in addition to the above, two *Zerstörerschulen* – Heavy Fighter Schools 1 and 2 – based at Schleißheim and Memmingen respectively, and used to train pilots intended for the Messerschmitt Bf 110, Me 410 and Ju 88 fighter squadrons. ZS 2 became ZG 101 in the spring of 1943.

So far, only passing mention has been made of night fighting. The question of intercepting enemy aircraft in the dark had scarcely been considered at the outbreak of war, but as the RAF's nocturnal raids began to become ever more damaging, the *Luftwaffe* was forced to react. Night-fighter pilots were by the nature of their task required to be better trained, most obviously in blind and bad weather flying, than their comrades operating in daylight. With a syllabus that laid heavy emphasis on instrument flying skills, more akin to that of bomber crews, it is perhaps not so surprising to find that there were so few *Nachtjagdschulen*. The excessive vulnerability of the *Zerstörer* heavy fighter aircraft by day led to these units converting to night fighting, with an attendant need for training. The first night-fighter school was therefore formed at Schleißheim, the pupils receiving their final polish with the training *Staffeln* of the operational units from 1941 onwards. By the autumn of 1942, other training units had been formed in the south of Germany, their designations reflecting the rather piecemeal nature of the entire night fighter force at that time. Later formations followed the more standardised numbering of semi-operational units begun in spring 1943. See Table 9 (*next page*).

Many an obsolescent or ex-enemy fighter aircraft was found a new use in the advanced fighter schools. A few of these types are described in more detail on the following pages.

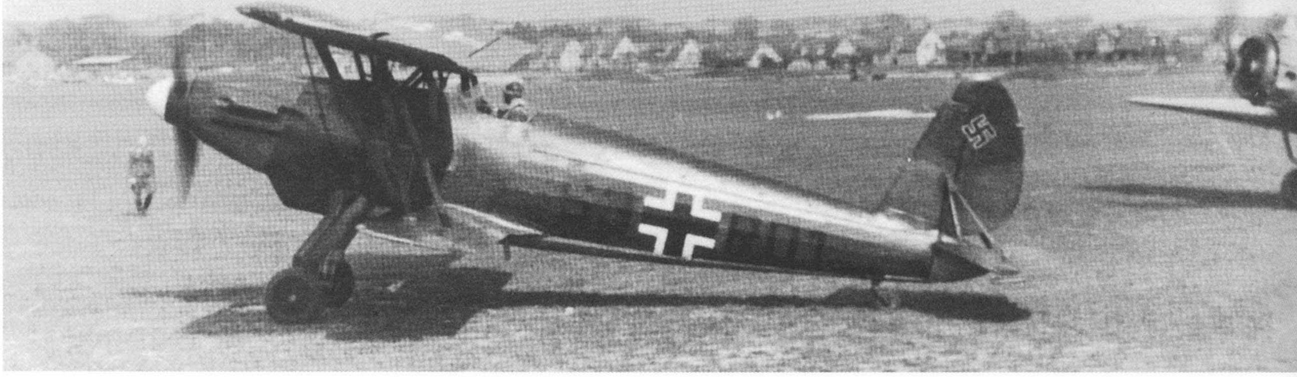
Table 9: **Major Luftwaffe Night Fighter Training Schools**

Unit	Date formed	Main Bases Used
NJS 1	September 1941	Schleißheim, Ingolstadt-Manching, Neubiberg
Erg./NJG 1	December 1940	Stuttgart/Echterdingen
Erg./NJG 2	August 1941	Gilze-Rijen, Parchim
1.(Erg.)/NJG 3	1940	Vechta, Schleswig
Schulstf./NJG 4	July 1943	Stuttgart/Echterdingen
Schulstf./NJG 5	June 1944	Königsberg
Schulstf./NJG 6	April 1944	Schleißheim, Kitzingen
4./(Erg.)/NJG 7	February 1944	Brieg
NJG 101	March 1943	Manching, Schleißheim, Munich-Reim
NJG 102	December 1943	Kitzingen, Powanden, Oels, Prague-Gbell

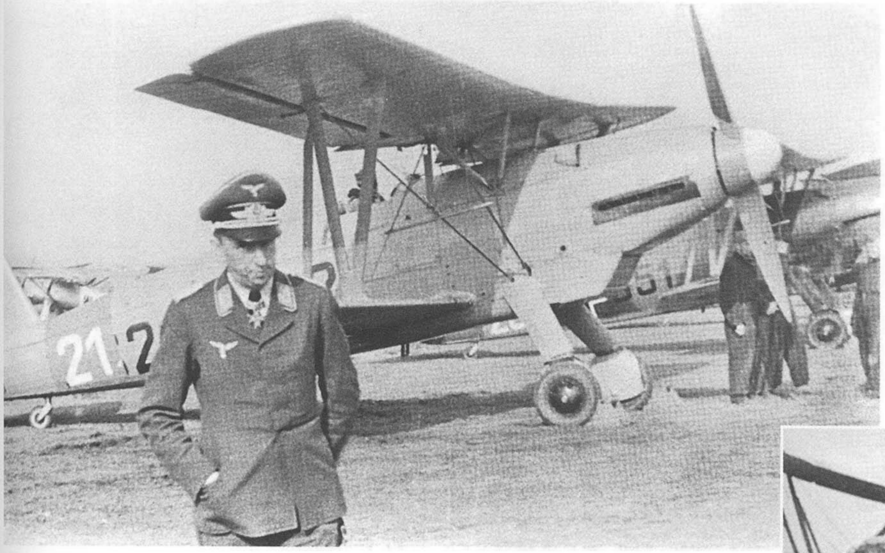
Arado Ar 68

The last fighter biplane to enter service with the *Luftwaffe*, the Arado Ar 68 was intended to be a replacement for the Heinkel He 51. A conventional machine with an open cockpit and a neat cantilever undercarriage, the unequal span and chord wings were of wood, covered with ply and fabric. The fuselage structure was typical for the period, being of welded steel tubes covered with metal and fabric, with a distinctively-shaped fin and rudder, which was to become a hallmark of several later Arado designs. First flown in 1934, the prototype, D-IKIN, powered by a 750 hp BMW VId in-line engine, lacked power. In turn, D-IBAS, the third prototype, was fitted with a new Junkers Jumo 210 liquid-cooled engine, which brought performance up to requirements. This version was therefore ordered into production as the Ar 68 E. Shortages of the Junkers engines, however, led to a decision to begin production of the BMW-powered version as the Ar 68 F. In late summer 1936, I./JG 134 and I./JG 131 became the first units to be equipped with the type. By the time the Ar 68 E started to arrive in the squadrons in spring 1937, the age of the biplane was clearly over and production ceased after 514 Ar 68s had been built. Three Ar 68 Es were delivered to Spain for trials as night fighters, but the far superior Messerschmitt Bf 109 had arrived; consequently most Ar 68 models were quickly transferred to the fighter schools. A few saw service as temporary night fighters with 10.(N)/JG 53, 10.(N)/JG 72 and 11.(N)/JG 72. Among schools known to have used the Ar 68 are A/B 14, A/B 23, A/B 32, A/B 33, A/B 115 and LKS 7.

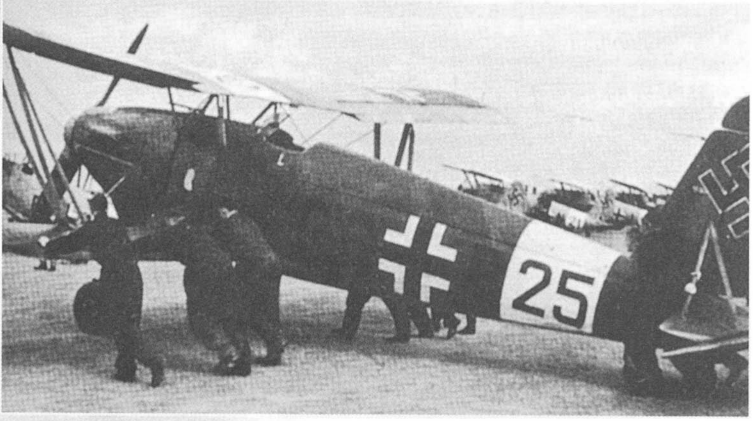
Specification	
Span:	11.00 m (36 ft 1 in)
Length:	9.50 m (31 ft 2 in)
Loaded weight:	2,020 kg (4,454 lb)
Max speed:	335 km/h (208 mph)



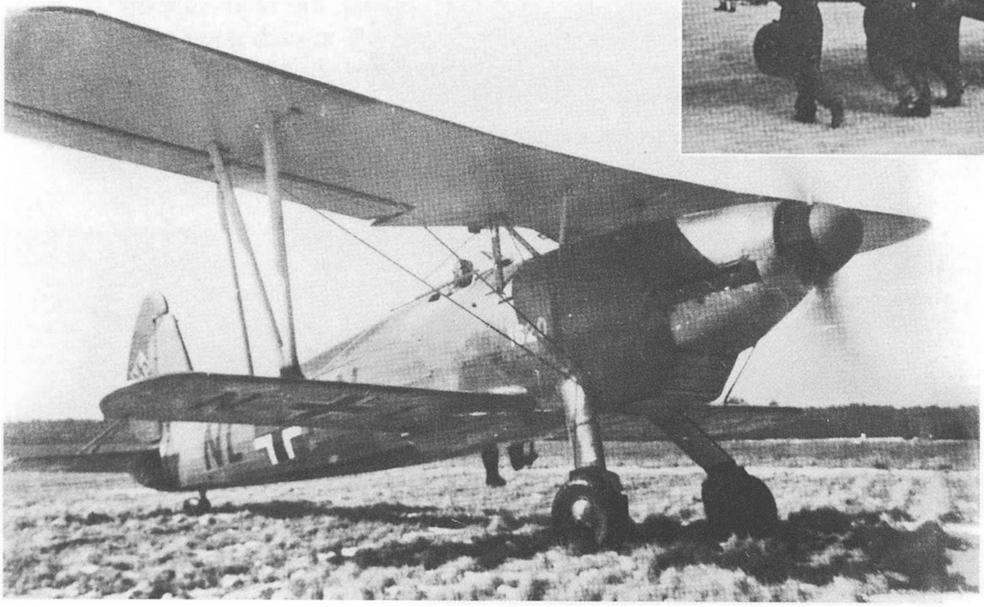
Arado Ar 68 E-1, '01', also of JFS 1 at Werneuchen, as indicated by the S3+R unit code. Date is probably mid-1940.



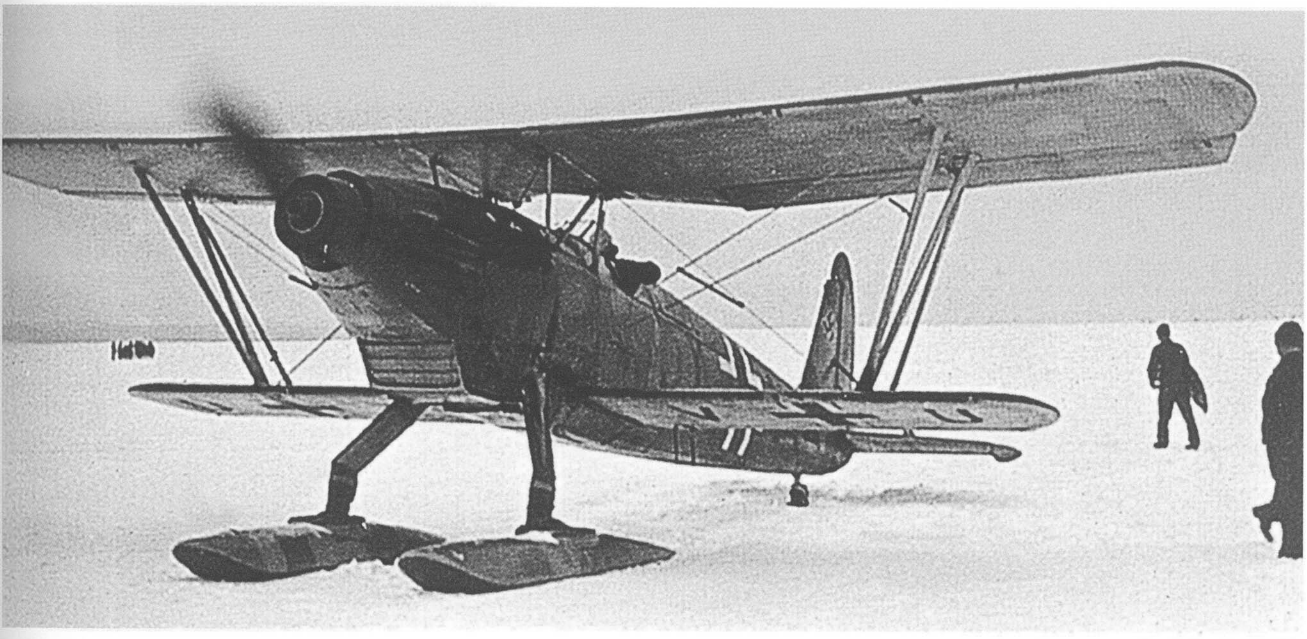
WWI fighter ace, Oberstleutnant Theo Osterkamp, wearing only his Pour le Mérite and no other decorations or ribbons, in front of a light grey Arado Ar 68 E-1, '21', in service as a fighter trainer with JFS 1 at Werneuchen. 'Uncle' Theo was in command until September 1939, when he took over command of JG 51. The underlying fuselage code is the early school marking, S2+??2, which has then had the simpler aircraft number, 21, applied in white over a red band. Date uncertain, but probably 1938.



ABOVE: A green camouflaged Ar 68 being manhandled by ground crews, probably at the fighter school JFS 1 at Werneuchen on account of the white band carrying a number, a style of identification favoured by JFS 1.



LEFT: A splinter camouflaged Ar 68 E, W.Nr. 1620, NL+?N, of an unidentified fighter school unit code. Date is probably mid-1940.

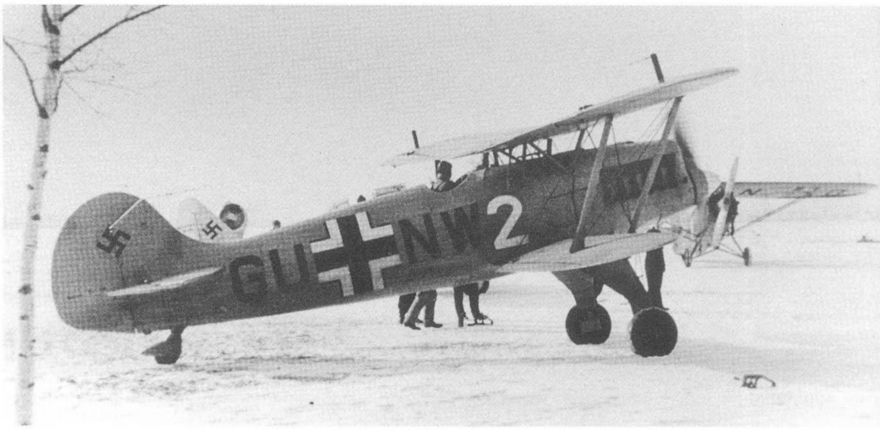


LEFT: The Arado Ar 68 was an unusual type to see on skis. This is Ar 68 E, DL(?)+VU, of A/B 32 on skis, seen at Chrudim, Czechoslovakia, in January 1941.

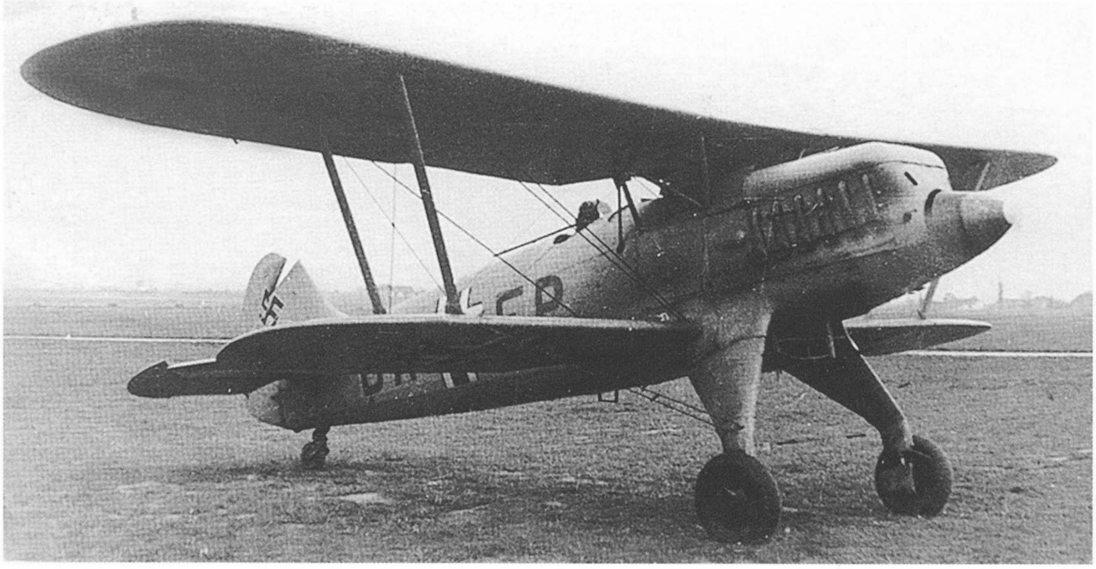
Heinkel He 51

Developed from a series of little prototype He 49 'sports' biplanes produced during the early 1930s, the Heinkel He 51 was ordered into production before the *Luftwaffe* officially existed. Ten He 51 A-0 aircraft, all civilian registered, were built in 1933, followed by the A-1 series in 1934. These were fully-equipped fighters and formed the first squadron of the resurgent *Luftwaffe*, JG 132 'Richthofen', in March 1935. 75 He 51 A-1 machines were built, succeeded by a batch of structurally improved B-0 versions. Thirty-eight examples of the B-2 ship-borne floatplane version followed for service on the *Kriegsmarine* cruisers. By the time production ended in 1938, 506 He 51s had been manufactured. An entirely conventional, if rather menacing-looking biplane of all-metal construction covered with fabric, powered by a BMW VI in-line engine giving 550 hp and carrying two MG 17 machine guns, the elegant Heinkel was a natural subject for the Nazi propaganda machine. The outbreak of the Spanish Civil War in summer 1936 gave an opportunity to demonstrate the superiority of German aircraft when an initial batch of six, rapidly followed by another 36, were sent to Spain to aid the Nationalists. All too quickly it became evident that the basic design concept of the He 51 was outdated. Several aircraft were soon damaged by the type's tendency to bounce and veer on landing. Even worse, the opposing Soviet-supplied I-15 fighters so completely outclassed the Heinkels that they were forced to avoid combat. By April 1937 the He 51 was being relegated to ground-attack duties, a role in which, to everyone's surprise, it was extremely successful. The result was the He 51 C, fitted with bomb racks for 50 kg bombs intended specifically for low-level close support, 79 of which were built under licence by Fieseler Flugzeugbau. Under the command of Adolf Galland, the close-support He 51 units effectively wrote the manual, which was to stand the *Luftwaffe* in such good stead during World War II. Overtaken by more modern aircraft, surviving He 51s in Germany were relegated to the fighter schools where their idiosyncratic landing characteristics gave student pilots interesting experiences. Schools known to have used the He 51 include A 43, A/B 71, A/B 120, A/B 123 and LKS 2.

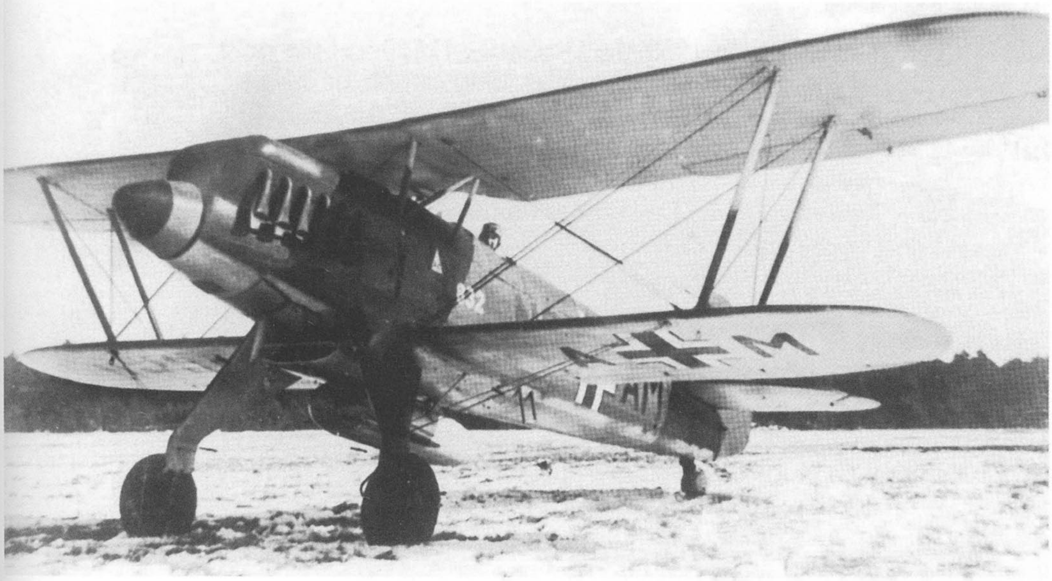
Specification	
Span:	11.00 m (36 ft 1 in)
Length:	8.40 m (27 ft 6¾ in)
Loaded weight:	1,900 kg (4,189 lb)
Max speed:	330 km/h (205 mph)



ABOVE: Heinkel He 51, GU+NW, 'White 2', in service with an unidentified training unit. Visible in the background are at least two ex-Armée de l'Air North American NA 64s and a Heinkel He 46, ??+NQ. The unit may be FFS A/B 121, based at Straubing, Bavaria.

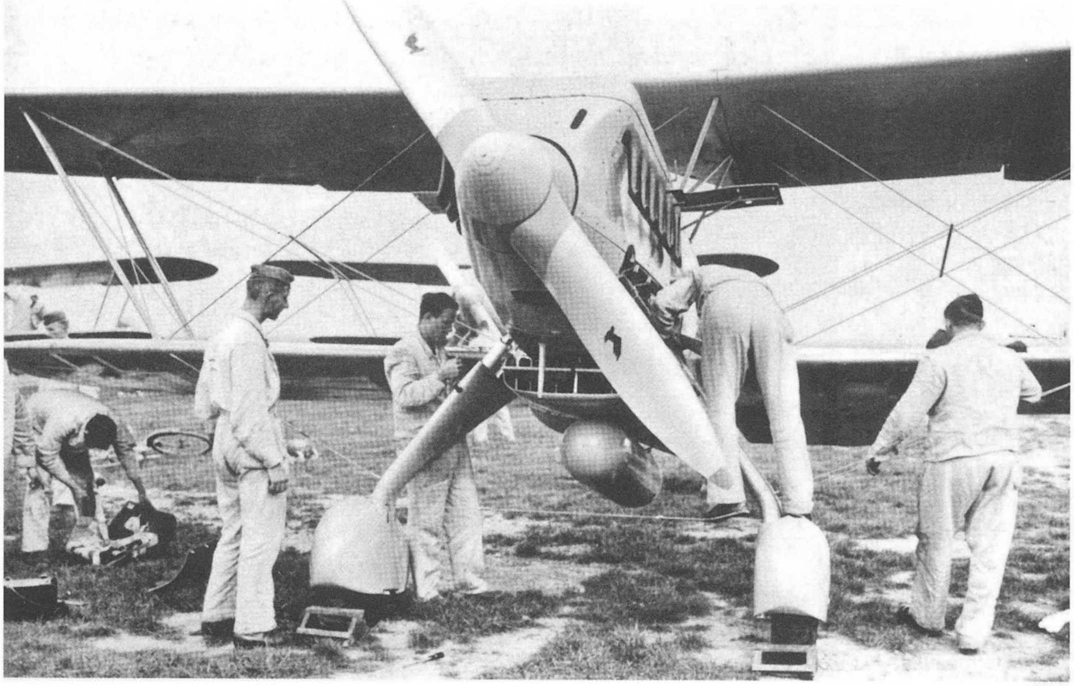


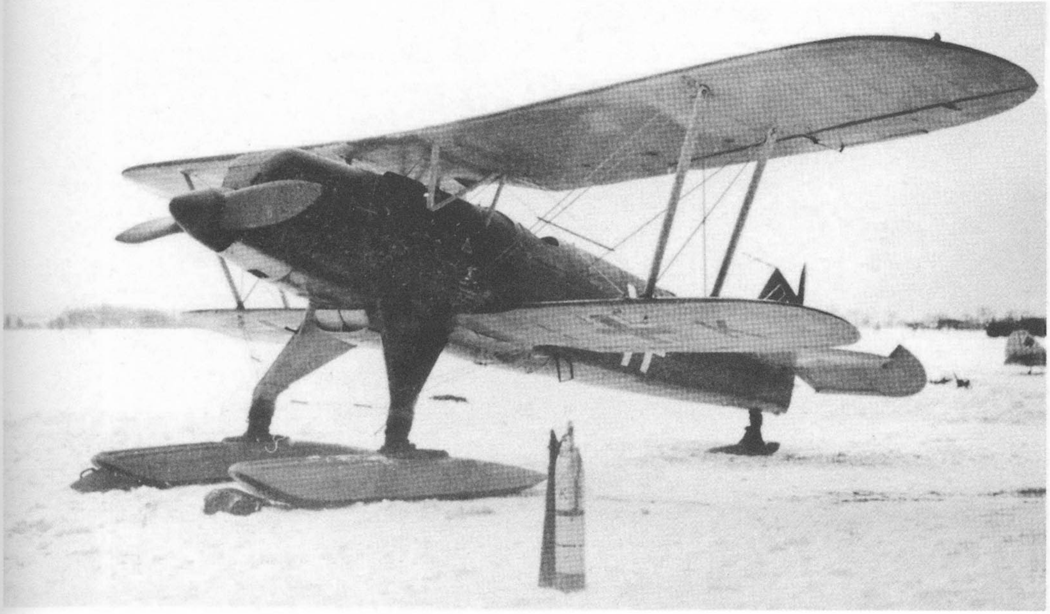
RIGHT: Another Heinkel He 51, possibly coded BA/X+F/EP, in use as a fighter-trainer. Date is probably mid-1940 although location is unknown.



LEFT: He 51, W.Nr. 832, N?+AM, probably in service with an unidentified JFS sometime after January 1942 when dark green uppersurfaces became mandatory for training aircraft.

BELOW: Although the He 51 was one of the earliest new fighter aircraft to enter service with the Luftwaffe as shown here, the aircraft was soon replaced by newer models like the Bf 109 and gradually this type was transferred to training units. This He 51 B-1 while still with 3./JG 135 has its engine cowling finished in pale blue, a similar colour to paint the forward half of the spinner. The centre of the propeller was finished in varnished polished wood colour, but the blades were painted pale grey (63) with the Schwarz company's logo on the front of each blade.





LEFT: A highly unusual picture of a Heinkel He 51 fighter-trainer wearing enormous skis. The underwing code appears to be H?+IK, and the oversized swastika just visible on the fin suggests that the date may be winter 1939-40. The location is unknown. (AMC)

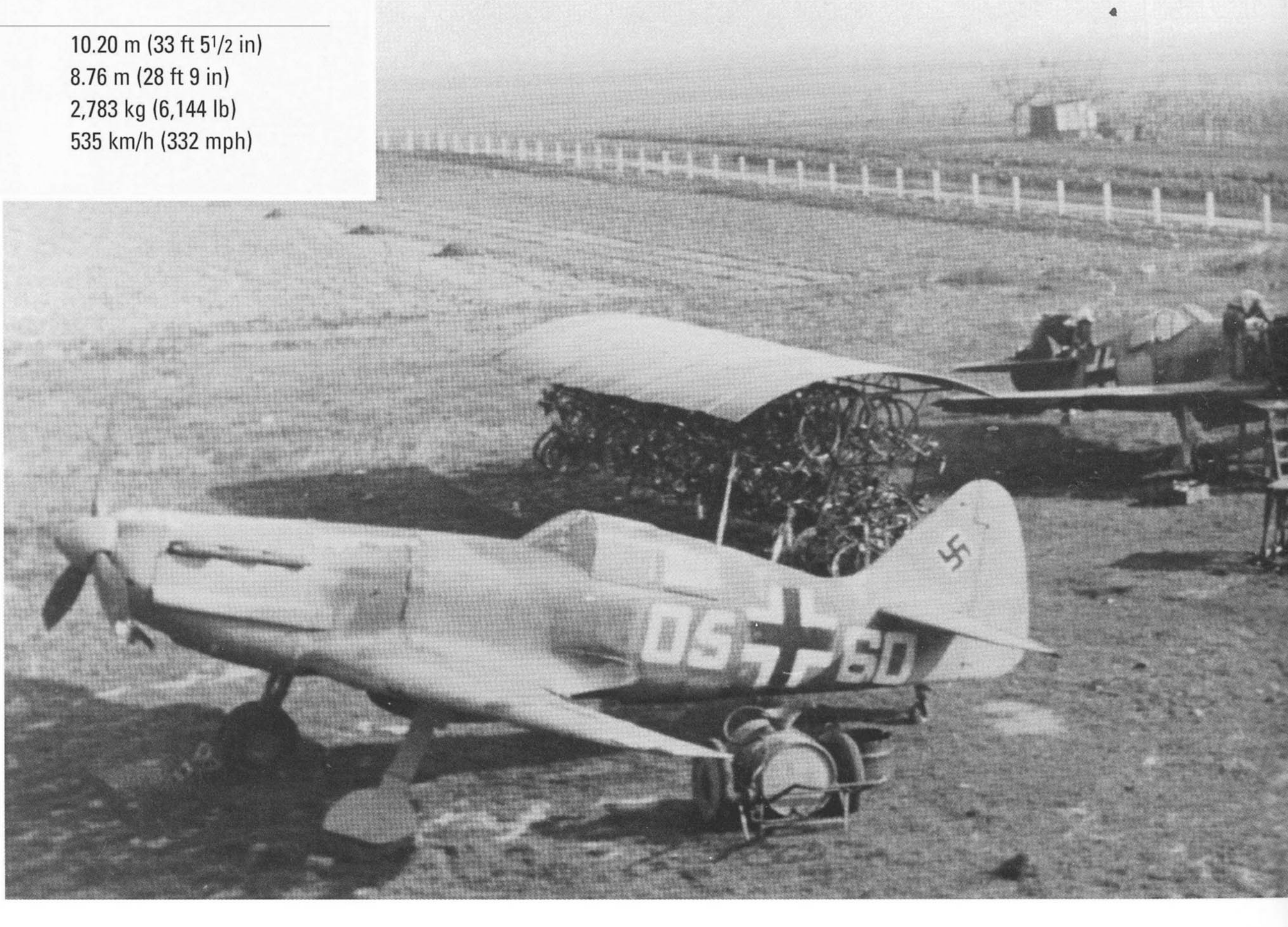
Dewoitine D.520

The great hope of the French fighter squadrons in 1939, the Dewoitine D.520 was the only fighter in French service at the time of the German assault in May 1940 capable of meeting the Messerschmitt Bf 109 E on something like equal terms. Had it not been for the fall of France, it is possible that the D.520 would have enjoyed a similar career to the Spitfire or Bf 109.

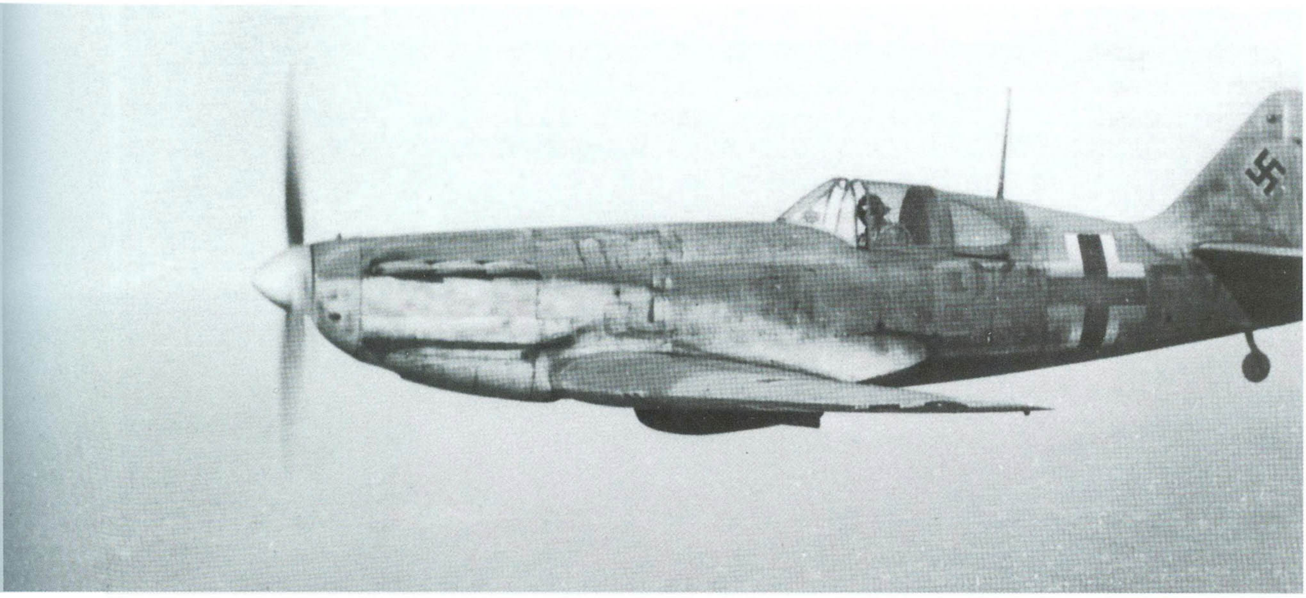
A successor to earlier monoplane fighters from the Dewoitine company, the D.520 resulted from a private venture by the company which resulted in an order for two prototypes in April 1938. By October 1938 the first prototype was ready for flight; it was a low-wing all-metal monoplane with a retractable undercarriage and an engaging toy-like quality with its long nose and short fuselage. Testing quickly discovered a number of shortcomings. The third prototype, D.520.03, incorporated modifications to the tail, cockpit canopy and undercarriage and established the essential features of the production versions. Powered by a Hispano-Suiza 12Y 45 in-line engine of 930 hp, giving a top speed of 332 mph and armed with a 20 mm cannon in the propeller hub and four 7.5 mm machine guns in the wings, the D.520 was a potent weapon. Clearly superior to all other French fighters then in service, 1,280 examples were on order by the outbreak of war. As a result of ill-judged nationalisation, however, the French aircraft industry was in a complete shambles and only 403 had actually been delivered by the time of France's defeat. In fact, only 79 had been accepted by the *Armée de l'Air* by 10 May. Those that were delivered acquitted themselves well, being responsible for 108 confirmed air victories between January and June 1940.

With over 320 left on charge, the Germans agreed that production could continue to equip the Armistice Air Force. When the Germans finally occupied the whole of France in November 1942, they seized 245 examples of the D.520 and instructed that another 150 be delivered by June 1944. The Dewoitines were put quickly into service as advanced trainers, a considerable number being passed on to German allies, notably Italy and Bulgaria. Three German fighter training wings were equipped with the little fighter – JG 101 and JG 103 were partially equipped, while JG 105, based at Chartres, was entirely equipped with the type. Few survived the handling of student pilots, only 55 or so surviving to be recaptured by the Allies.

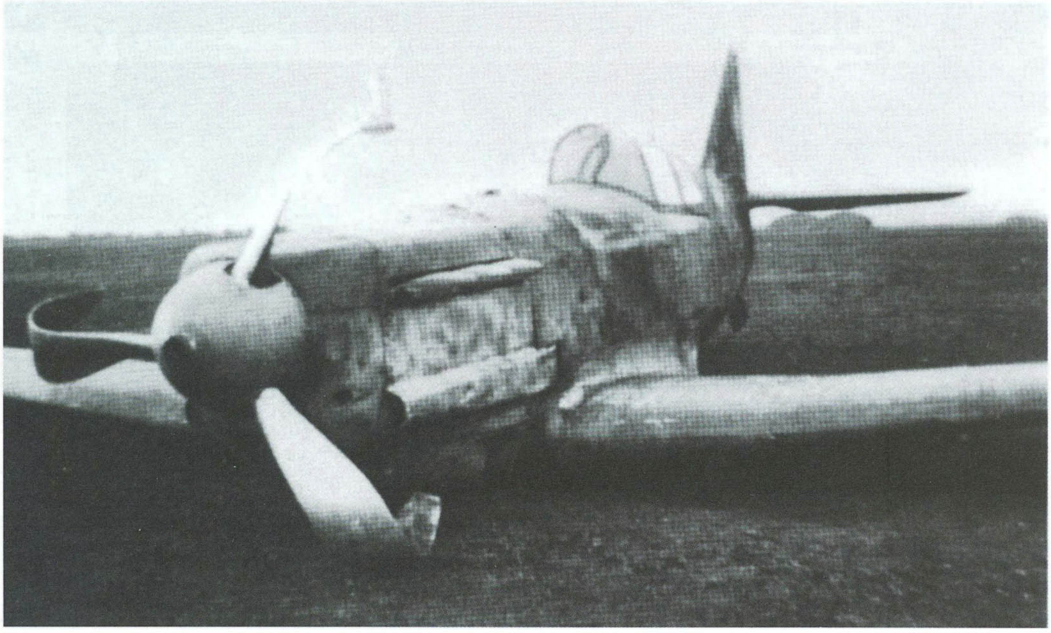
Specification	
Span:	10.20 m (33 ft $5^{1}/_{2}$ in)
Length:	8.76 m (28 ft 9 in)
Loaded weight:	2,783 kg (6,144 lb)
Max speed:	535 km/h (332 mph)



The Dewoitine D.520 was the only fighter in service with French fighter squadrons at the time of the German invasion in 1940. After the French surrender the Luftwaffe took over many of the surviving aircraft and then used them for fighter training. The French were also allowed to continue limited production. This photograph shows two D.520s in German markings with the first machine being refuelled and carrying the code 05+60 with the numbers painted in white.



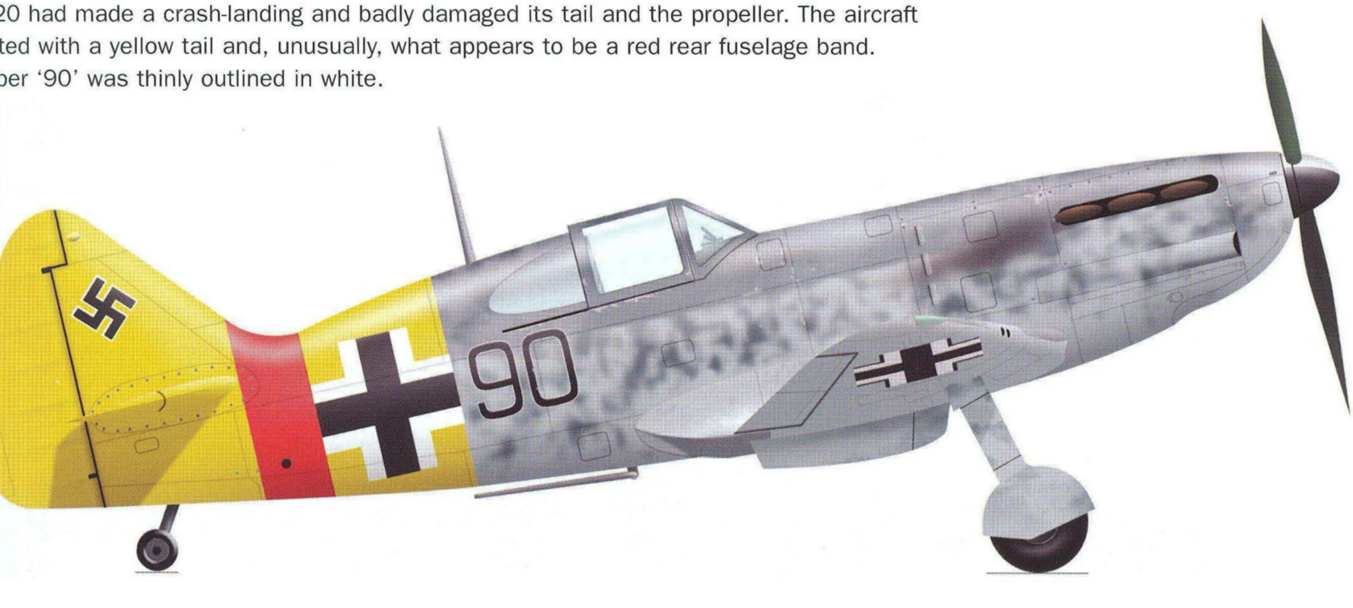
This Dewoitine D.520 was originally coded NE+GZ in black and was later redesignated with the number '84' in yellow in front of the fuselage cross when used as a trainer with JG 101 in Pau during 1944.

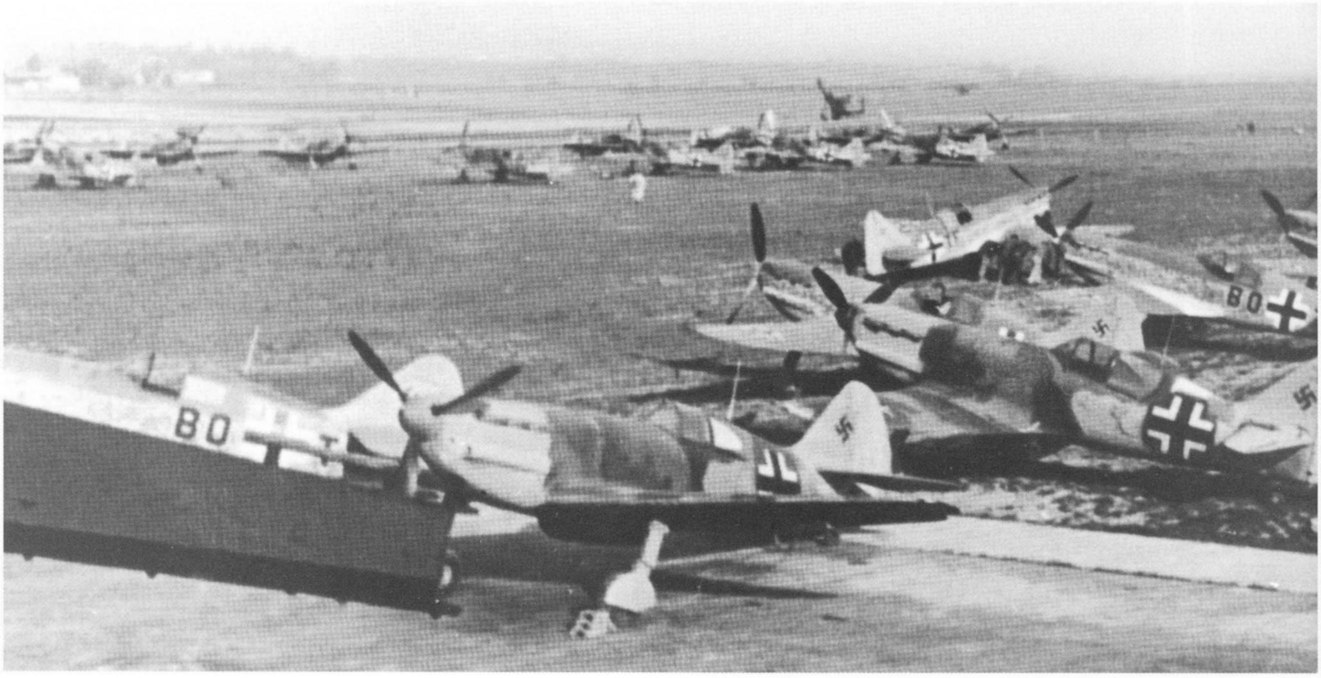


This Dewoitine D.520 was used by JG 101 for training purposes. Due to a mechanical problem the pilot managed to make a successful belly-landing at Pau in France during 1944.

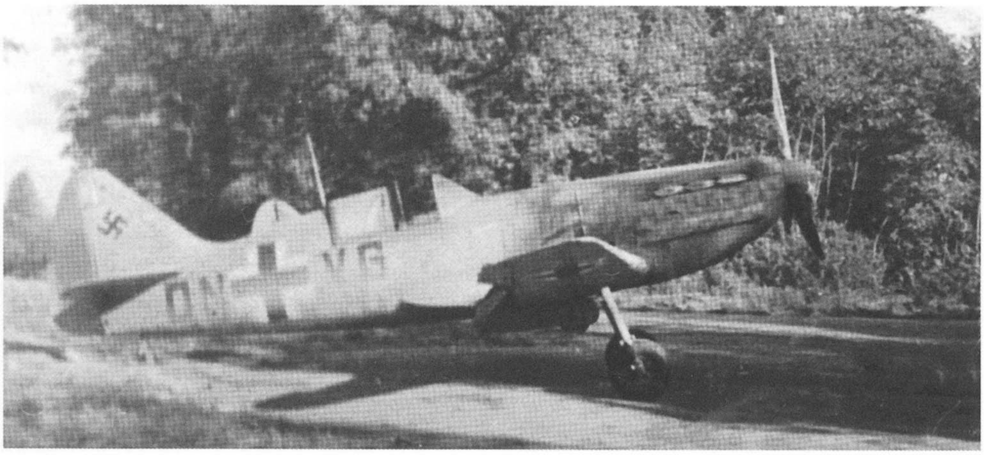
Dewoitine D.520, 'Black 90'

This D.520 had made a crash-landing and badly damaged its tail and the propeller. The aircraft was painted with a yellow tail and, unusually, what appears to be a red rear fuselage band. The number '90' was thinly outlined in white.

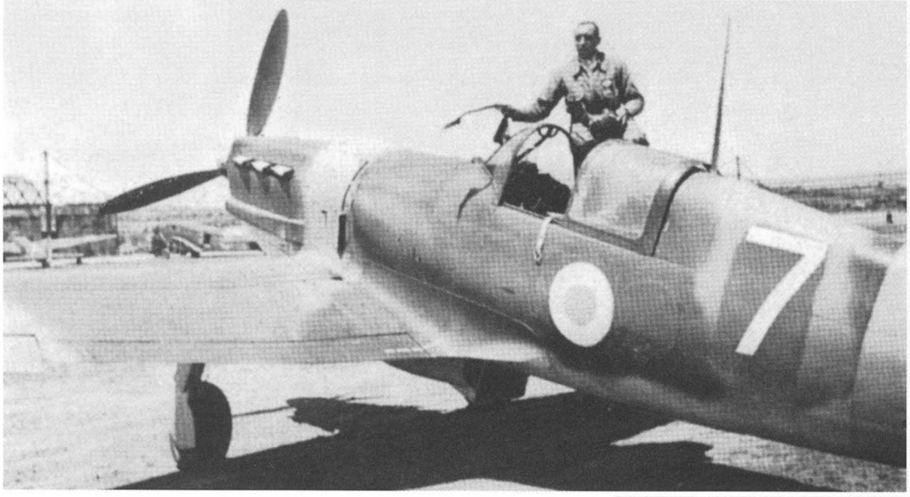




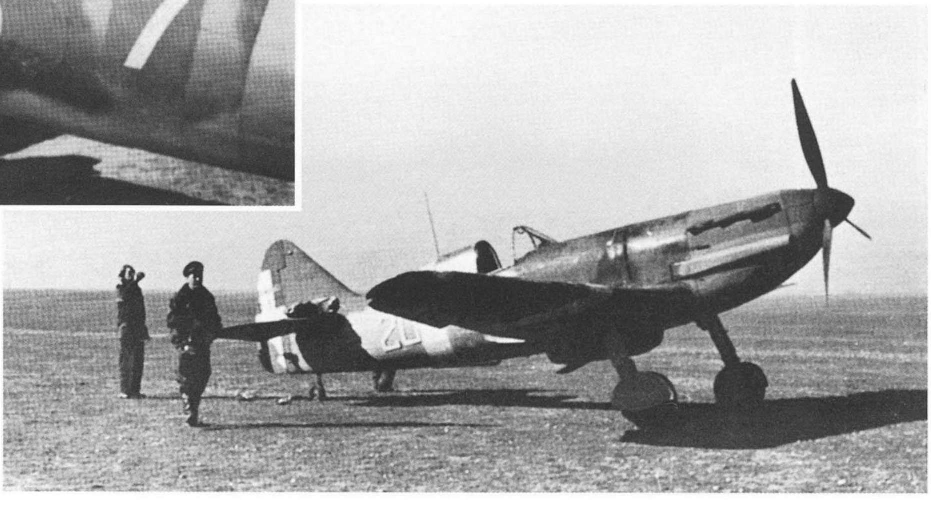
This collection of Dewoitine D.520s all carry Luftwaffe markings and were used for training purposes by JG 101 in Pau 1944.



Parked amongst the trees on the outskirts of the airfield at Pau these two D.520s stand ready for use. The nearest carries the code DN+VG in black but has not been given an individual number normally assigned to these training aircraft.



After the French surrender, some Dewoitine D.520s were allowed to continue to serve with the Vichy French Air Force. This rare photograph shows a pilot with one such machine carrying the French roundel under the cockpit, yellow number '7' in front of a yellow tail band.



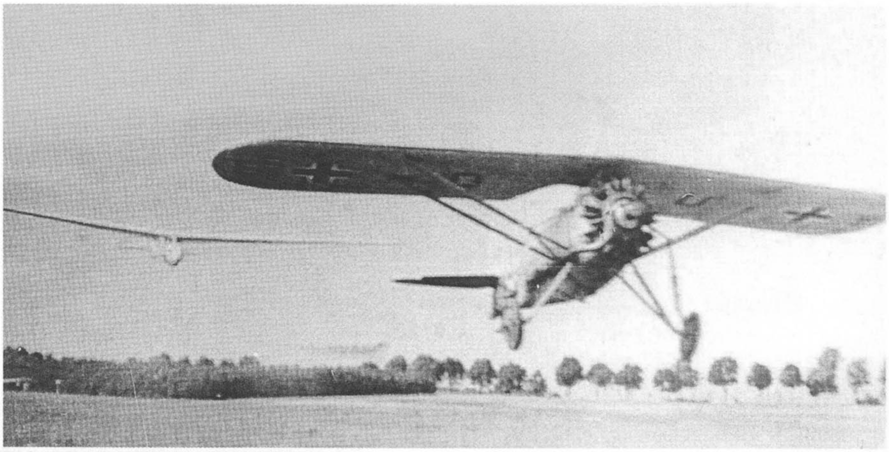
As this photograph shows, some D.520s also found their way to the Italian Air Force for use as fighter pilot training.

Morane-Saulnier MS 230 Et

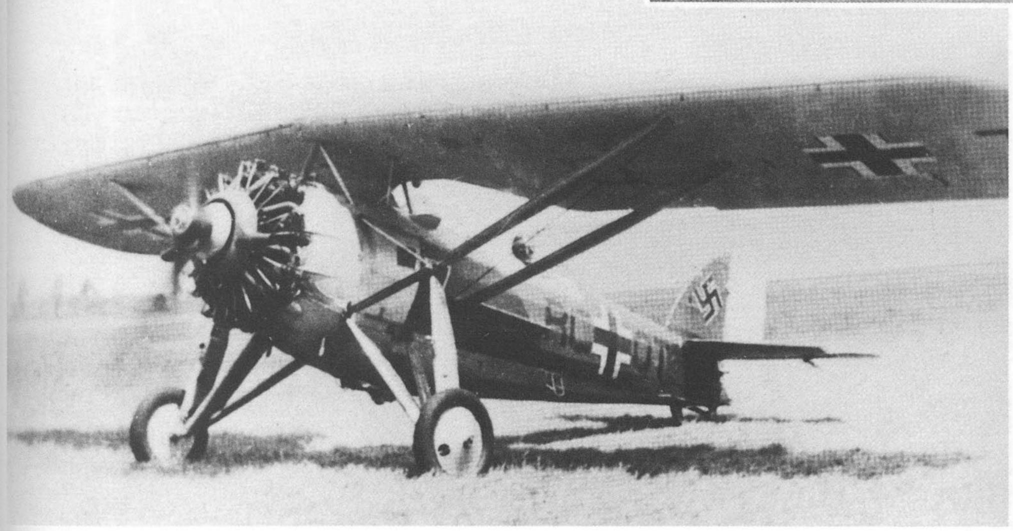
Flown for the first time in February 1929, the MS 230 was a logical progression in the long line of parasol monoplanes from Morane-Saulnier stretching back to World War I. Of fabric-covered mixed wood and metal construction, with a sturdy wide-track undercarriage, the two-seat open cockpit machine quickly proved to be an excellent advanced trainer. Powered by a 230 hp Salmson 9Ab radial engine, about 980 had been delivered to the training units of both the French *Armée de l'Air* and the *Aeronautique Maritime* by June 1940. During the course of its career, the fin and rudder were enlarged and both wood and metal propellers were used. When France fell, many of these aircraft were captured by the Germans and put to use in the *Luftwaffe* training units, until an RLM order dated 16 March 1943 ordered that they be scrapped, along with numerous other foreign types in service with the *Luftwaffe*.

Specification

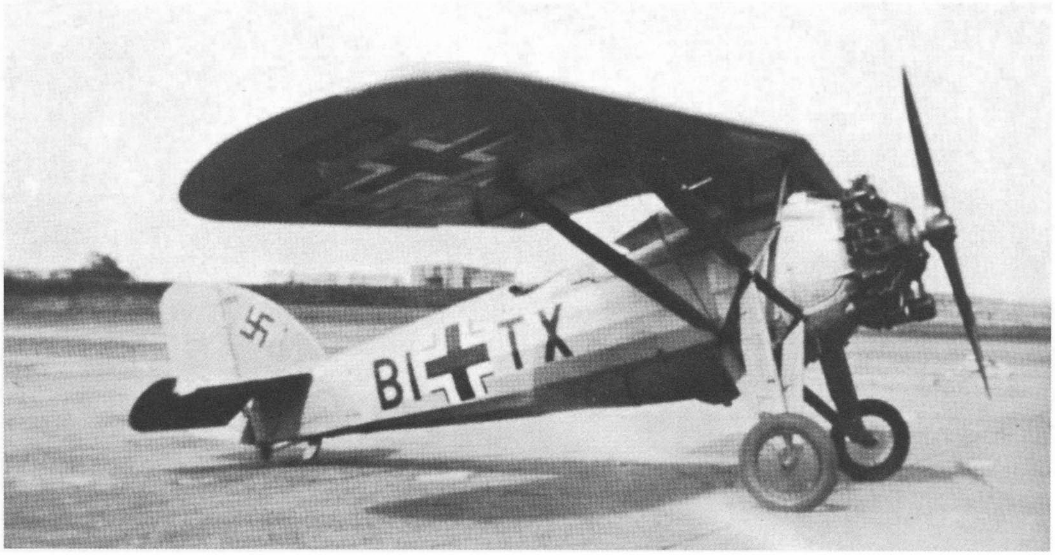
Span:	10.70 m (35 ft 2 in)
Length:	7.00 m (22 ft 9 in)
Loaded weight:	1,150 kg (2,533 lb)
Max speed:	205 km/h (127 mph)



A captured French Morane-Saulnier MS 230 trainer, BO+UY, in use as a glider tug with the Luftwaffe. Location and unit unknown.



This MS 230 was coded with the Luftwaffe marking BC+OT and carried a yellow-painted nose and rudder.



Several MS 230s were used by the Luftwaffe for various training purposes, including glider towing practice as well as pilot training. This one carries the Luftwaffe code BI+TX in black.

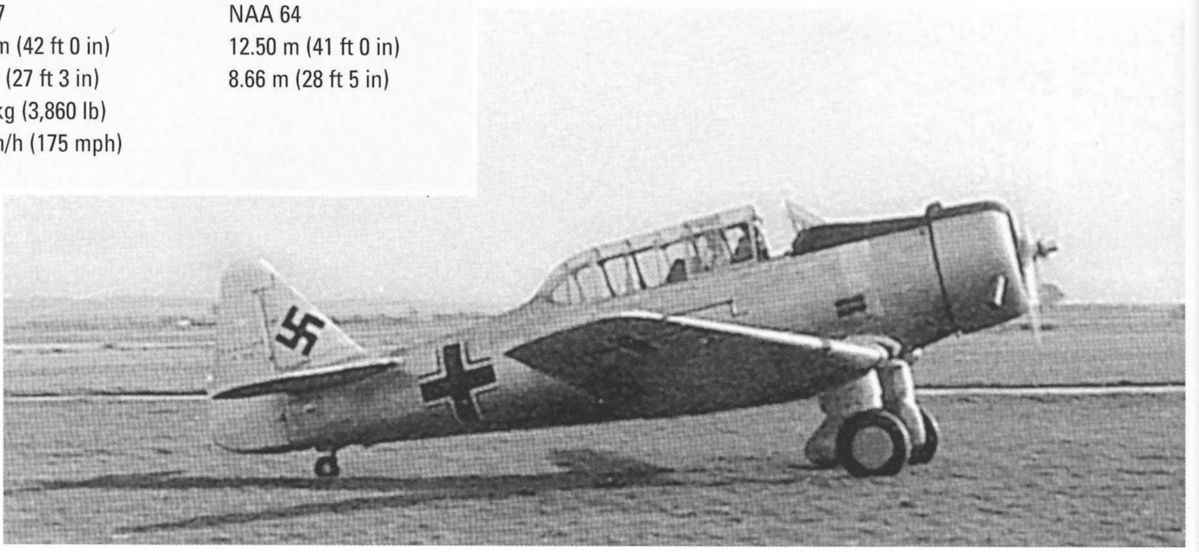
North American NAA 57 and 64

Overshadowed by their more famous descendant, the AT-6 Texan/Harvard, these fixed undercarriage two-seat trainers were bought by the French in quantity in an attempt to make up for its own industry's inability to deliver suitable aircraft. Built by the new North American company in response to a US Army Air Corps requirement for a basic trainer as the BT-9, the low-wing monoplane NAA 57 featured all-metal wings, a tubular steel fuselage covered in fabric, an enclosed cockpit canopy, fixed undercarriage and a Wright Whirlwind engine. A major asset was the ease of maintenance and a performance which closely resembled the more modern fighters then becoming available. Impressed by the American experience, the French ordered 230 customised versions (including the reverse throttle arrangement favoured by the French) of the NAA 57. All but 16 had been delivered by the time of the French surrender in June 1940. Of the 32 received by the *Aéronavale*, only 18 survived.

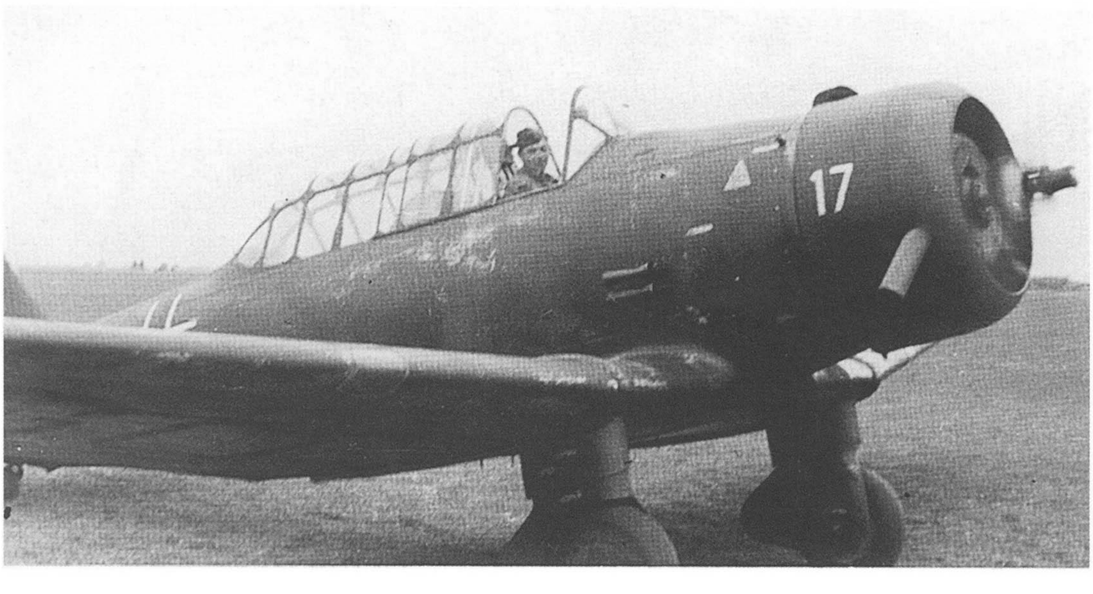
The BT-14 (NAA 64) was a development of the BT-9 for the USAAC featuring an all-metal fuselage, redesigned wings and a Pratt & Whitney Wasp engine, the aircraft strongly resembling a fixed undercarriage version of the later AT-6. The NAA 64 was also ordered by the French, but of the 230 ordered, only 111 had reached French territory by the collapse. Both American types then became the most modern trainers in the Vichy French inventory, where they served until the Germans occupied the whole of France in November 1942. After this event the *Luftwaffe* acquired yet more varieties of trainer aircraft with the accompanying Quartermaster's headaches. Among units known to have used the NAA 57 were JG 105, JFVS 1 and JFVS 2, while JG 107 had several NAA 64s.

Specification

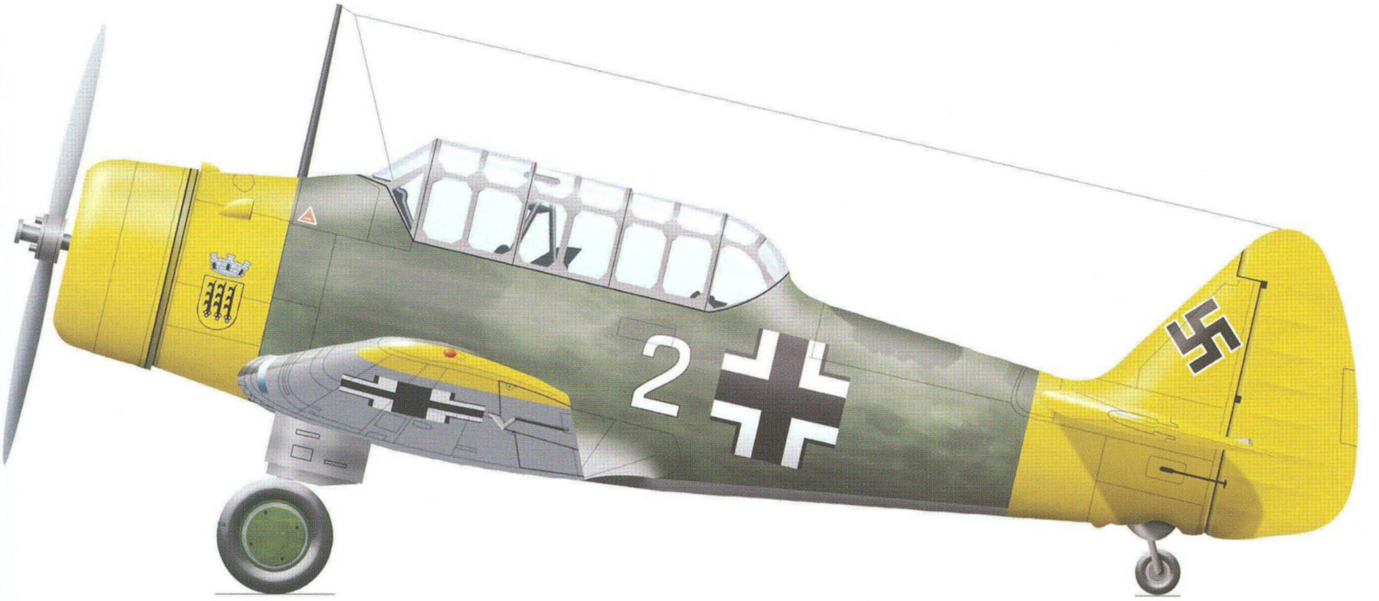
	NAA57	NAA 64
Span:	12.80 m (42 ft 0 in)	12.50 m (41 ft 0 in)
Length:	8.30 m (27 ft 3 in)	8.66 m (28 ft 5 in)
Loaded weight:	1,750 kg (3,860 lb)	
Max speed:	282 km/h (175 mph)	



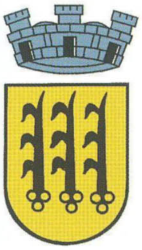
An all-silver ex-French North American NAA 64 serving in a Luftwaffe training school. The aircraft wears narrow 1939-style fuselage crosses, which suggests that it may have been refurbished in France, and was in service with a school in that country.



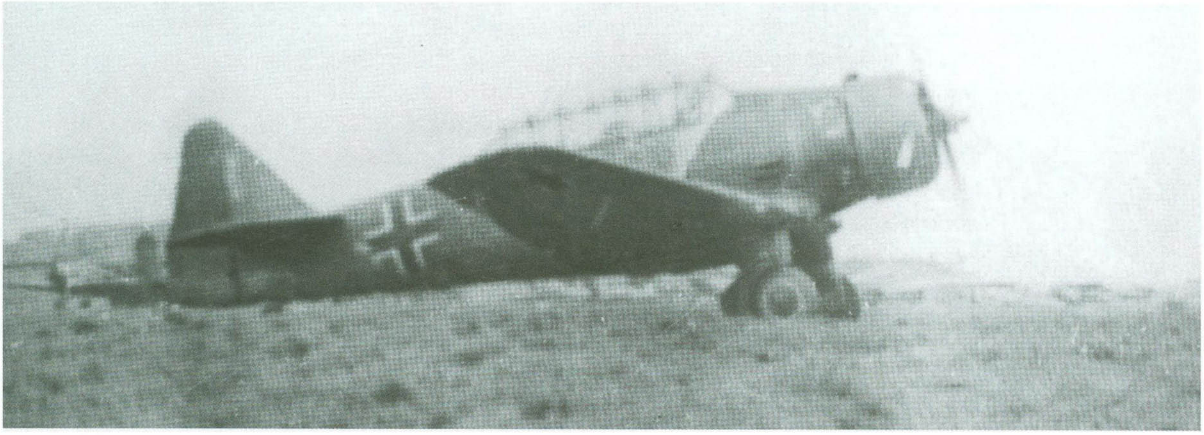
An ex-French l'Armée de l'Air North American NA 57 trainer, number 17, in service with the Luftwaffe. The very dark finish suggests that the aircraft is still wearing its original French camouflage scheme. Date and unit are unknown..

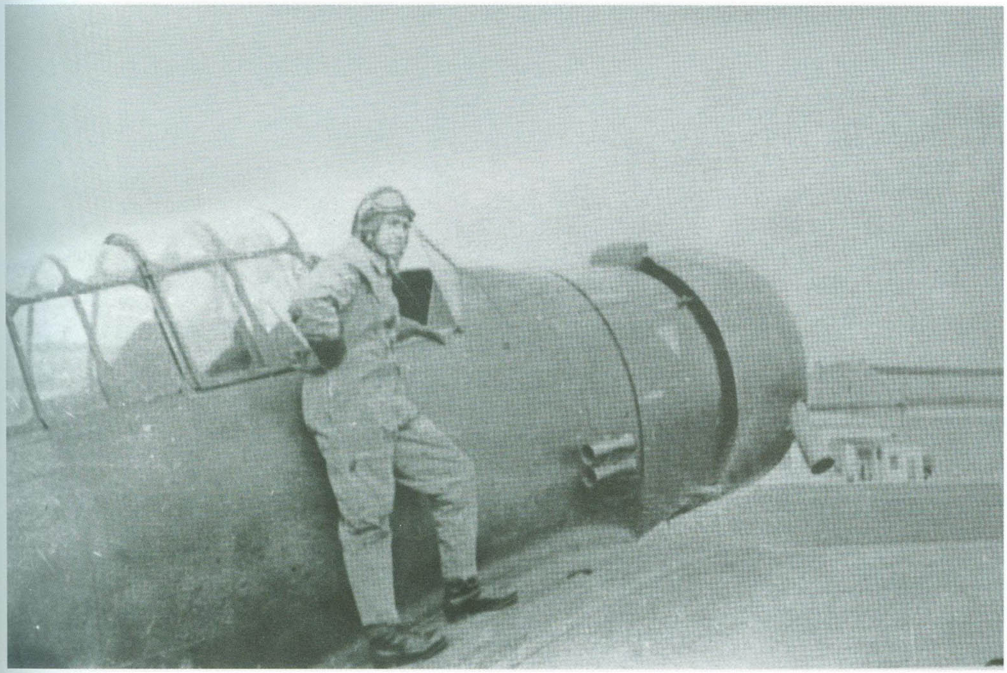


North American NAA 64 'White 2' of FFA A/B 43 mid-1943
After the fall of France several North American NAA 57 and NAA 64 Harvard aircraft were captured by the Luftwaffe with many of them subsequently being used as trainers. This machine was still being used in June 1943.



FFS A/B 43 Badge





ABOVE AND LEFT: These two photographs of an NAA 64 were taken at Olmütz airfield in Czechoslovakia during 1942.

Training by combat – the bombers

The fortunes of the bomber and transport units had already begun to decline in early 1940, when both aircraft and instructional crews from the training schools were requisitioned to take part in the costly air-landing operations in Norway and Holland. By doing so, the *Luftwaffe* staved off the immediate tactical crisis, but stored up problems for the future. This situation was further aggravated by the appalling losses over Crete between April and June 1941 when some 324 transport aircraft were destroyed. By the time of the disaster at Stalingrad in winter 1942-43, where another 500 aircraft and many of their crews were senselessly sacrificed, the training organisation had already been fatally weakened by shortages of fuel and instructors. Some idea of the perpetual difficulties with which the Schools had to cope can be gained by a brief look at the situation in FFS C 15 on 21 March 1941:

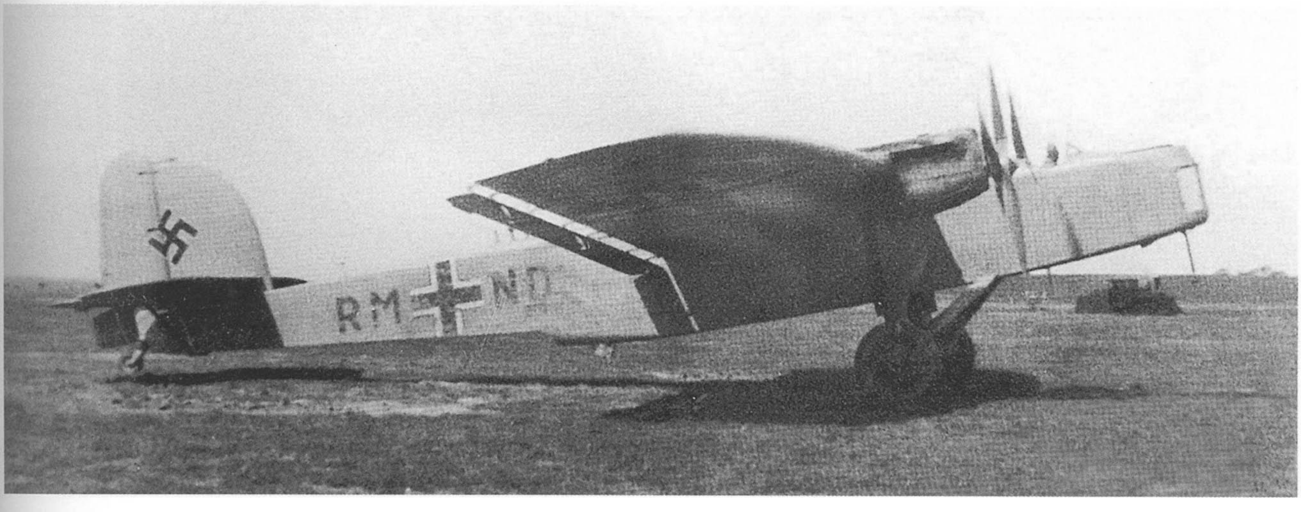
	Intended	Actual
Instructors	40	26
Auxiliary Instructors	--	8
Flight trainees	160	209
Aircraft	78	48

As described earlier, the prospective *Luftwaffe* bomber or transport pilot was required to gain his C1 or C2 licence at a *Flugzeugführerschule* C (FFS C) before he was regarded as competent to fly the larger German machines. (Although generally referred to as 'C' licences, strictly speaking these two licences should be known as the ELF-1 and ELF-2 – *Erweiterter Luftwaffenflugzeugführerschein* – extended licences). The demanding syllabus of the C schools meant that appropriately qualified instructors were at a premium, some of the most valuable being ex-Deutsche Lufthansa pilots. These men, who had learnt their trade pioneering long-distance flying in all weathers, were among the most experienced pilots in Germany. They were not, however, exempt from the demands of front-line service and the attendant risks. In passing, while it must be acknowledged that none of the major pre-war European air forces had really recognised how great a need there would be for transport aircraft, one of the many possible reasons for the *Luftwaffe* High Command underestimating the need for such aircraft with such dramatic effects upon the training system was the existence of Deutsche Lufthansa. Erhard Milch, the wartime Inspector-General of the *Luftwaffe*, had been a member of the Board of the German state airline since 1926. Consequently, the mechanisms for converting the airline into a ready-made military transport arm already existed – indeed on the outbreak of war 22 aircraft and crews were promptly requisitioned. The easy availability of this organisation may, however, have blinded the *Luftwaffe* Staff to the need for proper planning, as DLH had only 145 aircraft in total in September 1939 – a wholly inadequate number to support military operations when it is realised that over 300 aircraft were lost on Crete alone.

Table 10: **Luftwaffe Advanced Flying Training Schools**

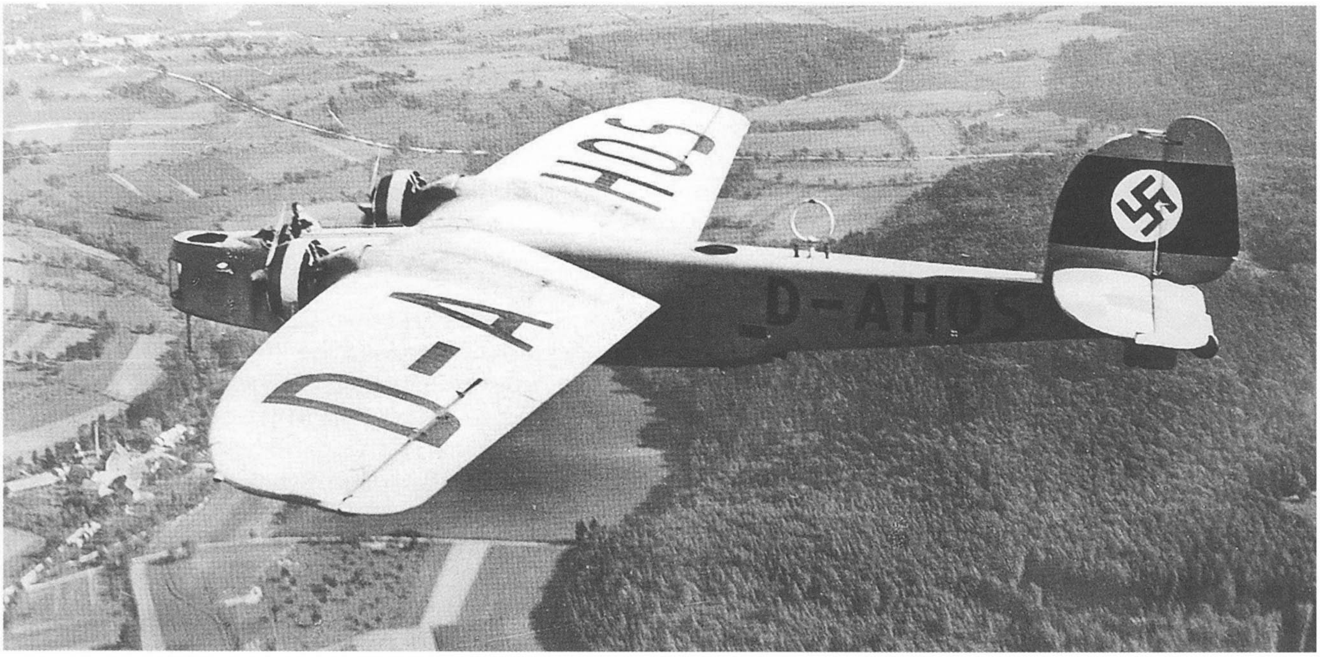
School	First Formed	As C School	Main Bases	Comments
FFS C 1	1938	January 1940	Pyritz, Sorau	Closed September 1942.
FFS C 1	March 1943	March 1943	Schweinfurt, Bayreuth-Bindlach	From A/B 51. To FFS A 7 July 1944.
FFS C 2	July 1934	April 1939	Neuruppin, Schwerin	As B 2 from October 1943. Closed March 1945.
FFS C 3	1936	January 1940	Alt-Lönnewitz, Sprottau	As B 3 from October 1943. Closed September 1944.
FFS C 4	July 1934	January 1940	Perleberg, Sprottau, Barth	As B 4 from October 1943. Closed March 1945.
FFS C 5	February 1934	January 1940	Ludwigslust, Neubrandenburg	As B 5 from January 1943. Closed March 1945.
FFS C 6	November 1937	January 1940	Burg b/Magdeburg, Stade, Kolberg	As B 6 from October 1943. Closed March 1945.

School	First Formed	As C School	Main Bases	Comments
FFS C 7	July 1934	January 1940	Celle, Finsterwalde, Clermont-Ferrand, Gablingen	As B 7 from October 1943. To FFS A 5 July 1944.
FFS C 8	March 1933	January 1940	Fürth-Atzenhof, Wiener-Neustadt, Eisenstadt-Trausdorf, Parndorf	As B 8 from October 1943. Closed September 1944.
FFS C 9	October 1937	January 1940	Roth-Kiliansdorf Altenburg, Pretzsch	As B 9 from October 1943. Closed September 1944.
FFS C 10	1938	January 1940	Landau, Fürstenwalde	As B 10 from October 1943. To LKS 10 August 1944.
FFS C 11	April 1939	January 1940	Zeltweg/Steiermark	As B 11 from October 1943. Closed January 1945.
FFS C 12	1938	January 1940	Wesndorf, Prague-Ruzyne	To BFS 3 July 1942.
FFS C 12	February 1943	February 1943	Olmütz	As B 12 from October 1943. (New formation) Closed July 1944.
FFS C 13	January 1940	January 1940	Rosenborn, Nancy, Toul, Delme, Roth-Kiliansdorf, Öttingen	As B 13 from October 1943. To JG 111 June 1944.
FFS C 14	December 1939	January 1940	Ohlau, Prague-Gbell	As B 14 from October 1943. Closed March 1945.
FFS C 15	January 1940	January 1940	Lüben, Gablingen, Bourges, Steinamanger	As B 15 from October 1943. Closed October 1944.
FFS C 16	May 1940	May 1940	Burg/Magdeburg, Weissenwarthe, Sachau	Closed April 1945.
FFS C 17	January 1941	January 1941	Pütnitz, Greifswald Bug, Güstrow, Barth	From FFS *(See)* 2. Closed September 1944.
FFS C 18	September 1941	September 1941	Lüben, Schönfeld-Seifersdorf	As B 18 from October 1943. Closed September 1944.
FFS C 19	September 1941	September 1941	Ohlau, Gleiwitz, Woisselsdorf	As B 19 from October 1943. To III./NJG 102 June 1944.
FFS C 20	October 1941	October 1941	Rosenberg, Krosno, Tonndorf, Bednary	As B 20 from July 1944. To FFS A6 July 1944.
FFS C 21	September 1941	September 1941	Bialystok, Rosken, Königsberg, Thorn, Hannover	As B 21 October 1943. Closed September 1944.
FFS C 22	September 1941	September 1941	Wien-Aspern, Oels, Liegnitz	As B 22 from October 1943. Closed October 1944.



An angular and ugly Do 11 apparently finished in overall RLM 02 Grau, in service in the early part of the war as a trainer.

In the early part of the war, the land-based 'C' schools were endowed with quantities of obsolete or war-weary front-line aircraft, mostly of the Do 11, Do 23, Do 17, He 111, Ju 52/3, Ju 86, Ju 88, Si 204 types, but also with a few of the B2 types. As the war progressed, a trickle of more advanced aircraft such as the He 177 bomber found their way to the schools. Shortages of suitable aircraft, however, meant that captured foreign machines were equally acceptable. In particular, the French Caudron C.445 and similar types saw extensive service as navigation and instrument trainers before crews commenced instruction on the heaviest C types proper. Brief details of some of the less well known of these types follow:



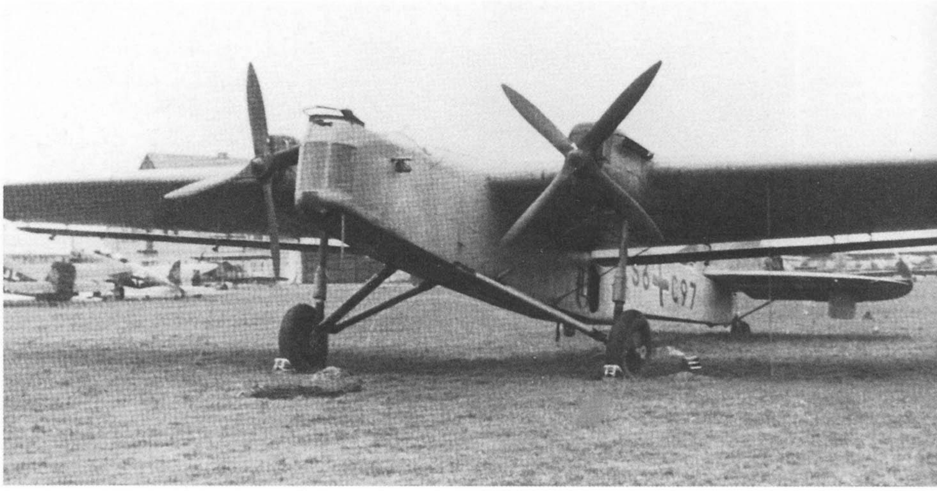
A Dornier Do 11 coded D-AHOS, finished in overall L40/52 grey on a quasi-civil training flight on 27 Septembe 1935.

Dornier Do 23

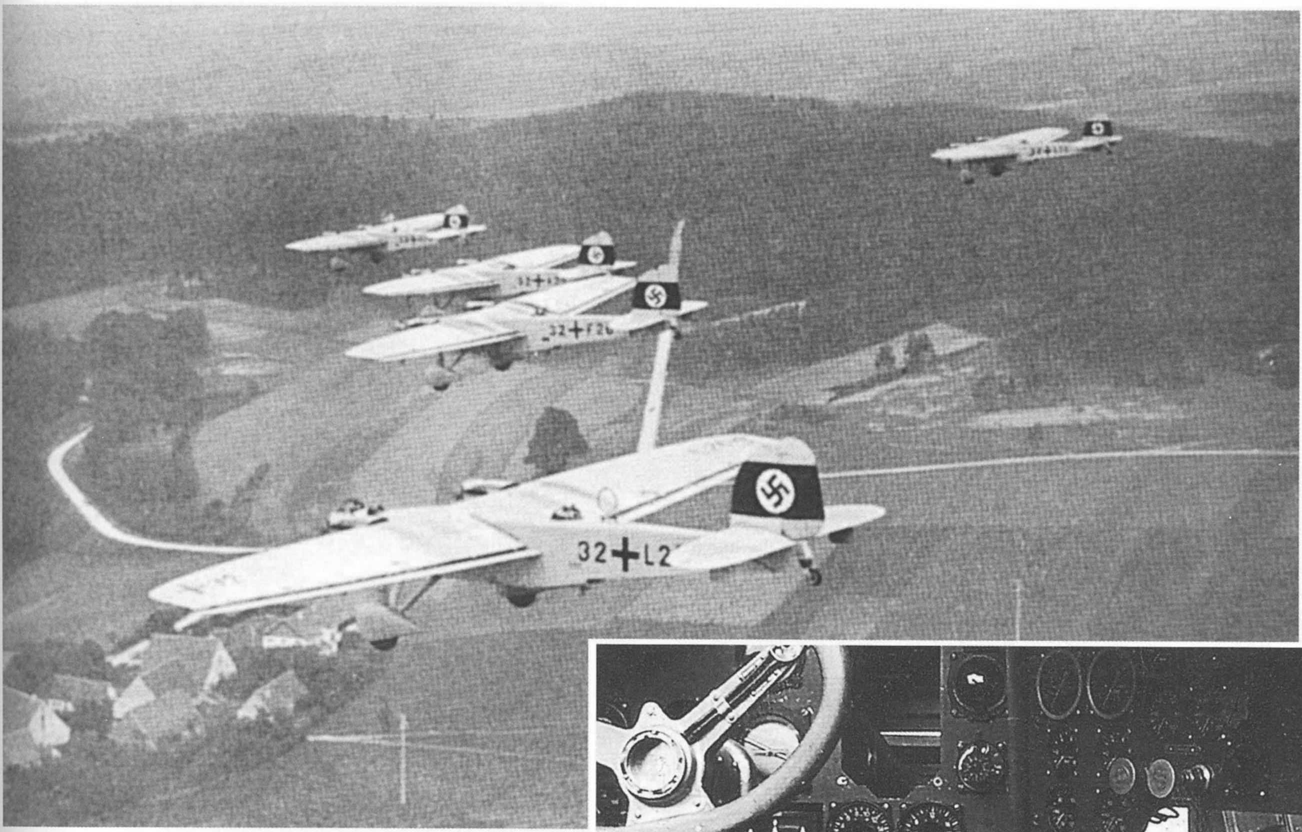
First flown in 1934, the ponderous Dornier Do 23 bomber was a development of the earlier Do 11 and Do 13 incorporating modifications intended to strengthen the airframe and reduce vibration. The first version, known as the Do 23 F, was quickly followed by the main service type, the Do 23 G. Powered by two BMW VId in-line engines of 750 hp each, the machine was intended to be a supplement to the main *Luftwaffe* bomber then in service, the Junkers Ju 52/3m. Already obsolescent in engineering terms, the tubular steel structure, mostly fabric covered, was always structurally suspect. The type also left much to be desired in terms of handling and speed, the massive fixed and spatted undercarriage not helping in this respect. Freed from the necessity to disguise their true purpose after the *Luftwaffe* was revealed to the world, later types of aircraft offered far superior performance and the 200 or so Do 23s built were quickly passed on to the advanced training schools. A very few were fitted with degaussing rings as mine sweepers. Some of those known to have served with flying schools were S13+D49 of FFS C Fürth, RK+NS, TF+BR and PB+AK.

Specification

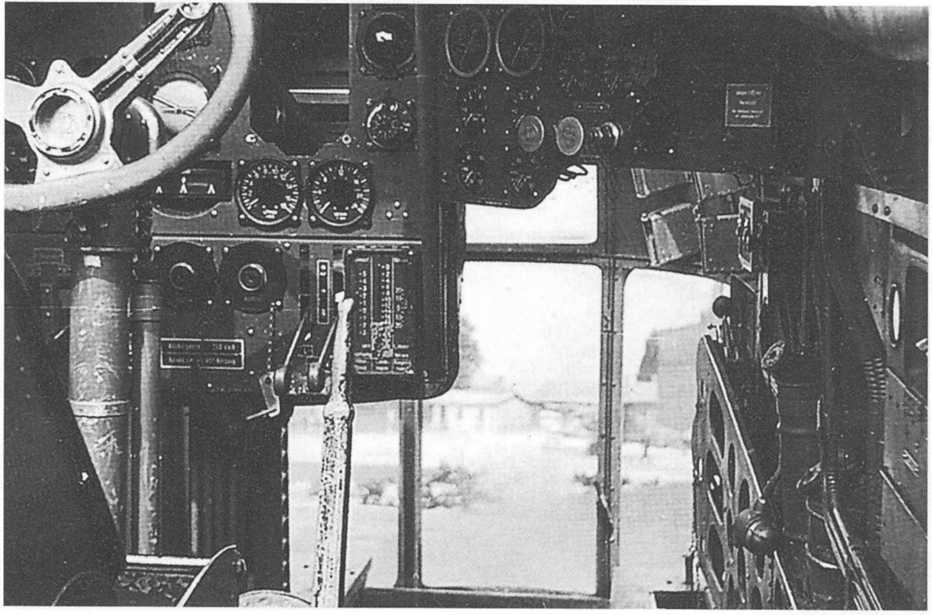
Span:	25.60 m (84 ft 0 in)
Length:	18.80 m (61 ft 8 in)
Loaded weight:	9,200 kg (20,290 lb)
Max speed:	262 km/h (163 mph)



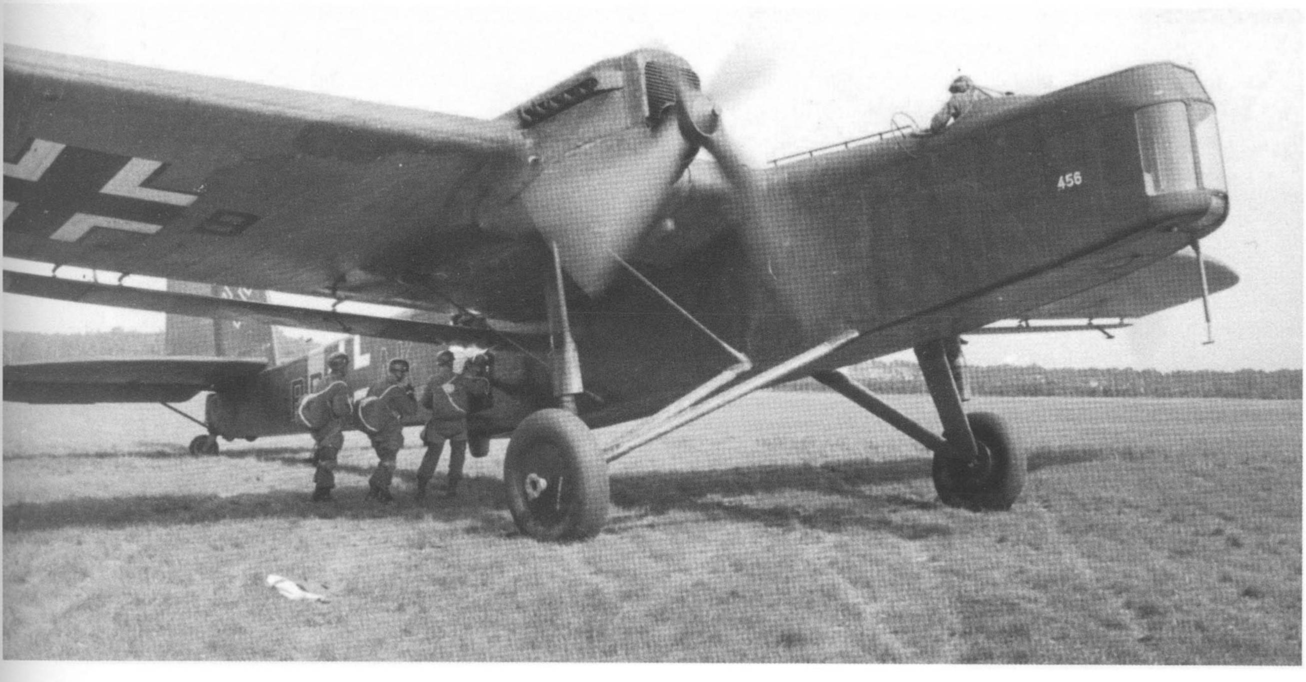
A Dornier Do 23 coded S6+C97, aircraft '97' of the Fliegerwaffenschule at Parow. A Junkers W 34, rudderless He 70 and He 50 can be seen in the background. Finish is probably overall RLM 02 Grau. (AMC)



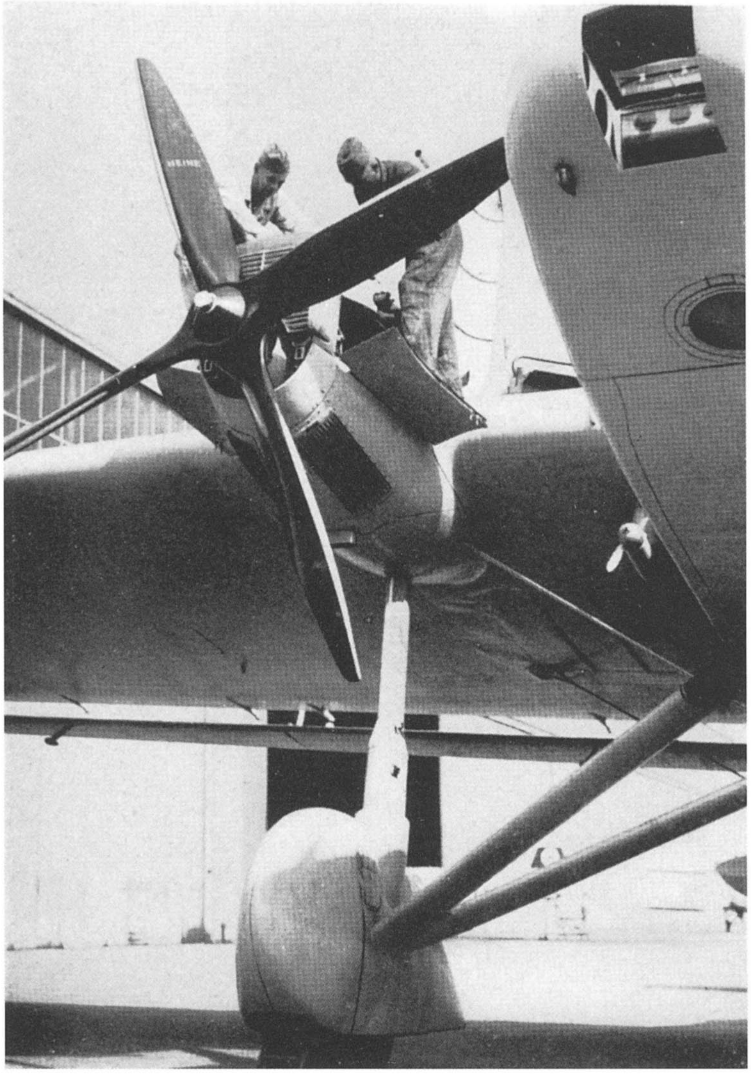
A formation of Do 23 G bombers of 4./KG 153 in flight near Fürstenwalde in 1937. The code of the nearest Dornier to the camera, '32+D24', indicated that it was individual aircraft 'D' of the fourth Staffel '4' of the second Gruppe '2', of the second Geschwader '2' formed within Luftfkreiskommando 3, '3'.



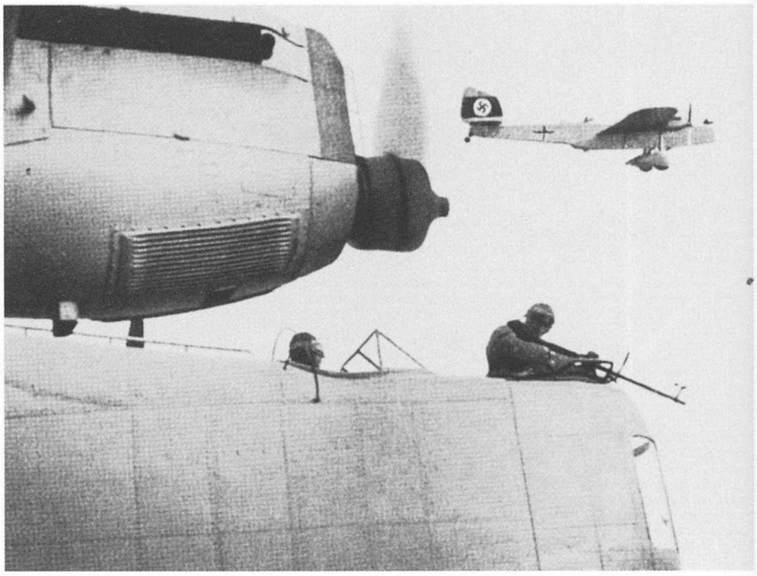
The cockpit and balcony window of a Do 23 in service with an unknown C school.



This Do 23 coded BC+AK W.Nr.456, after being taken out of front-line service was used for parachute training.

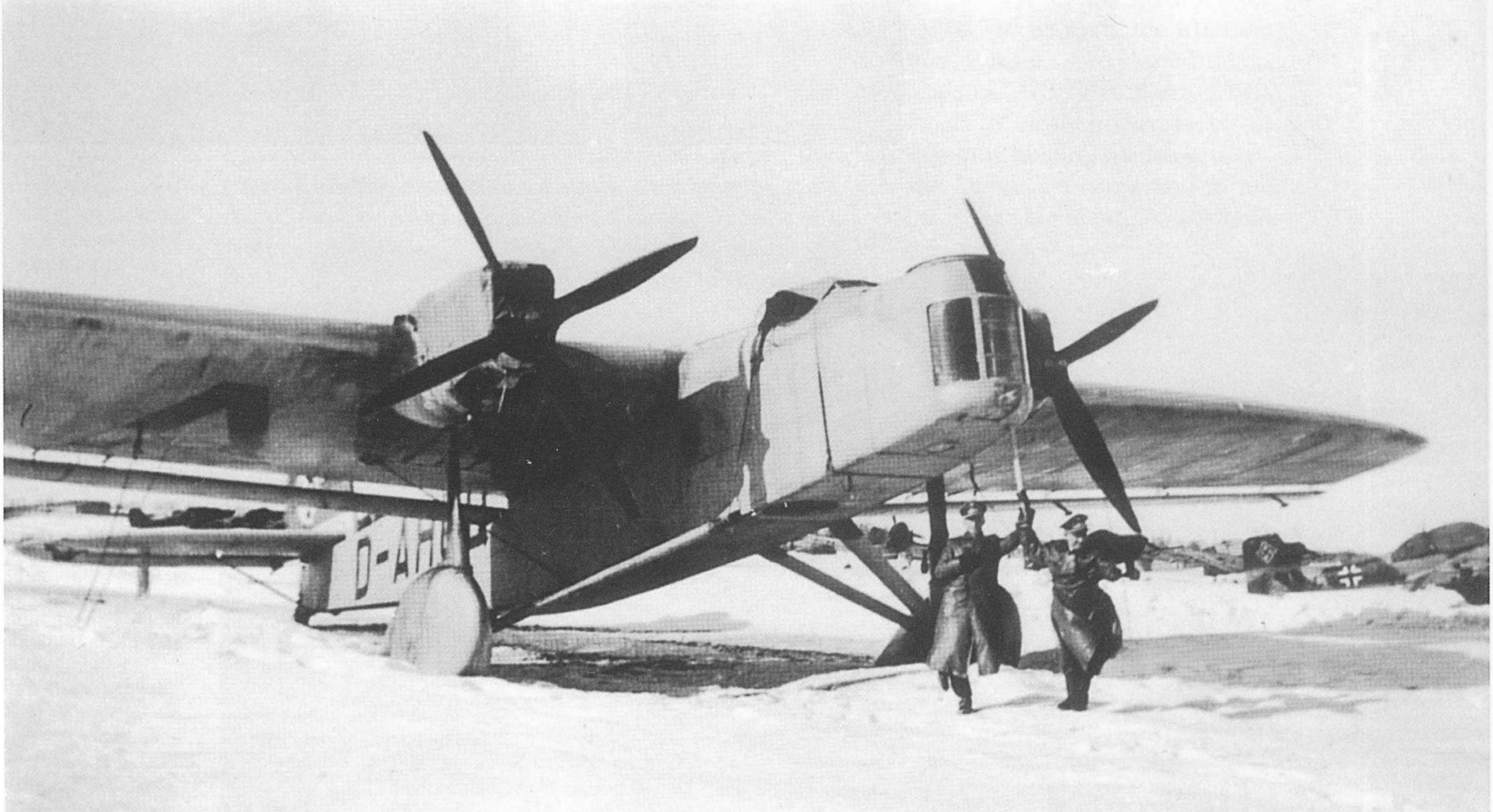


LEFT: Mechanics at work on the starboard 750 hp BMW VI engine of a Do 23. The somewhat clumsy fixed, spatted undercarriage is notable as is the four-bladed wooden propeller and generator mounted under the wing centre section near the fuselage.



ABOVE: This close-up of a Do 23 shows to advantage the open pilot's and gunner's position in the fuselage nose. The gunner was provided with a single 7.9 mm MG 15 flexibly-mounted machine gun on a D 30 mounting ring.

BELOW: Although 150 Do 11s and 222 Do 13s (an interim version of the Do 11 with a fixed undercarriage and Junkers-style double-wing flaps) were intended to be built, both types were abandoned due to their structural weakness and replaced by the Do 23. This Do 23, which carries a civil registration, was probably used as a squadron 'hack' aircraft.



Junkers Ju 86

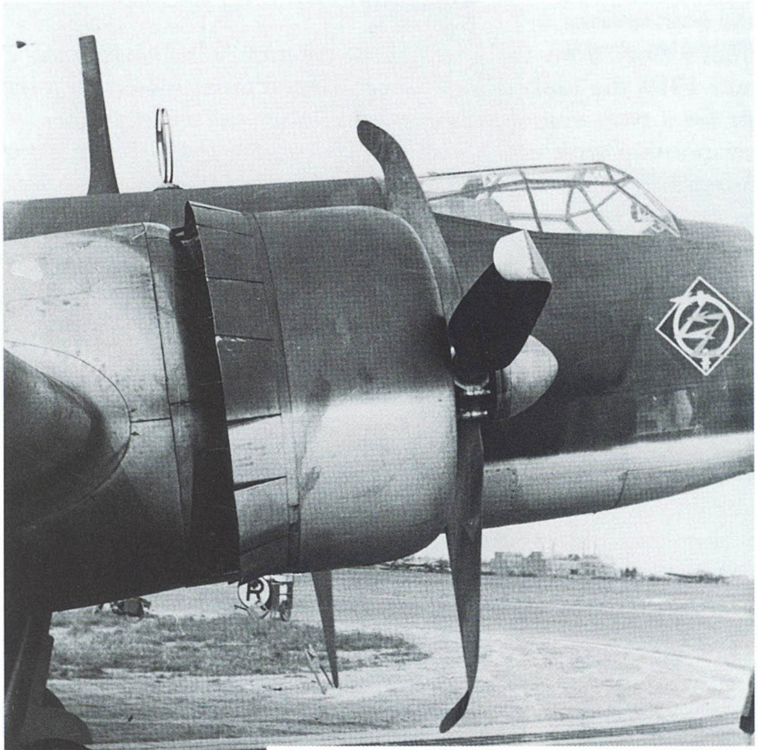
The first Junkers design to move away from the corrugated structure which had been a trademark of the company since 1919, the Junkers Ju 86 was designed in response to a joint military and civil requirement for a twin-engined aircraft suitable for use as an airliner or bomber. Retaining a family relationship with earlier Junkers types in the shape of the wing and the double-wing flaps, the twin-tail low-wing monoplane made use of a narrow-track retractable undercarriage which was to be a source of problems throughout its service. The intended powerplants of innovative Junkers Jumo diesel engines of 600 hp each were not available for the first prototype; consequently, these were fitted to the Ju 86 V3, D-ALAL, which first flew in April 1935 in military configuration. A pre-production batch of thirteen followed in early 1936. At the same time, work was proceeding on the civilian version, for which the V2, D-ABUK, was the prototype. Following various modifications, KG 152 Hindenburg received the first production Ju 86 A-1 examples in spring 1936, just as the first 10-seat Ju 86 B airliners reached Lufthansa. By the end of the year, both bomber and civil versions had been exported to a number of countries, in every case powered by conventional air-cooled piston engines. Problems with stability led to the introduction of the military Ju 86 D with an extended tail cone and greater fuel tankage. The greatest problem, however, was the chronic unreliability of the diesel engines and consequently BMW-built versions of the Pratt & Whitney Hornet radial engine were fitted to the Ju 86 E. This model began to replace the Ju 86 D in squadron service from late summer 1937. Further developments were a batch of 40 or so Ju 86 G models with redesigned front fuselages intended to give better pilot vision. By the autumn of 1938, experience in the Spanish Civil War had led to the conclusion that the Ju 86 in any current version was not a good bomber – the rather erratic flight characteristics made accurate bomb aiming very difficult.

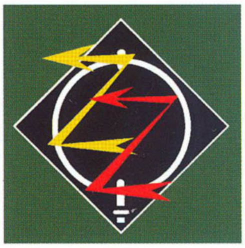
With the arrival of the greatly superior He 111 and Do 17 bombers into service, the decision was taken to withdraw the 235 examples of the Ju 86 in its several versions from front-line use and transfer them to secondary duties. Development of the basic airframe into the long-wingspan, high-altitude Ju 86P and Ju 86 R reconnaissance versions continued well into the mid-war years. Small numbers of these were converted from existing Ju 86 D airframes, but the bulk of the remainder went to the bomber schools where they provoked a classic example of the in-fighting among the *Luftwaffe* commanders which bedevilled them until the final collapse.

Faced with growing demands for transport aircraft in early 1940, the Front commanders were already requisitioning the Junkers Ju 52/3m transport aircraft, which had become the standard training machine in the C schools, and their instructor crews. This had been logical when no alternative aircraft existed, but no other aircraft in service used three engines and a steering wheel. However, it seemed sensible to the Chief of Staff of the training arm, *General* Deichmann, that the Ju 52 be turned over to the transport squadrons and the Ju 86 substituted in the training units. The Ju 86 was not wanted by any other part of the *Luftwaffe* and in 1940 the manufacturers still had components for another 1,000 examples. With new petrol engines and dual controls, the Ju 86 could have become a useful, though short-ranged training machine, with the civilian legacy of its roomy fuselage making it an ideal flying classroom. This eminently practical suggestion was rejected by Erhard Milch, Göring's deputy, on the grounds that all production capacity was needed for the Ju 88. This reasoning is suspect, as Milch was far from convinced of the potential of the 'Wonder Bomber'. Possibly he wished to reduce the stranglehold which Junkers was developing on the German aircraft industry, for in 1938 Junkers already employed over half the industry's workforce. Whatever the reason, a logical solution to a growing problem was ignored, the training units were condemned to act as a reservoir of transport crews and aircraft and the training system was doomed to slow decline – but then logic was never a strong feature of the Nazi hierarchy. Those models of the Ju 86 which did reach the schools, among them the radio school at Halle/Saale, LKS 13, gave sterling service until finally worn out. Data for the Ju 86 D-1 is as follows:

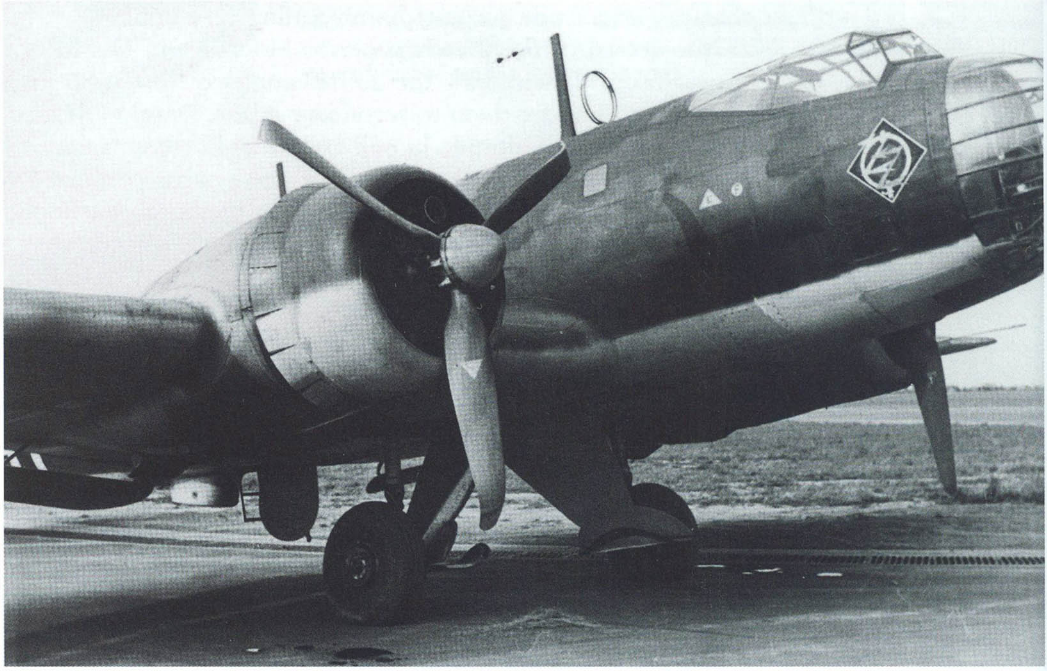
Specification	
Span:	22.50 m (73 ft 9 3/4 in)
Length:	17.60 m (57 ft 9 in)
Loaded weight:	8,200 kg (18,080 lb)
Max speed:	300 km/h (186 mph)

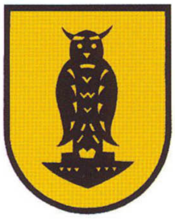
This Ju 86 E belonging to the LN Schule at Prague-Ruzyne in Czechoslovakia during 1941 suffered propeller damage during a landing. The machine has the standard splinter camouflage pattern of RLM 70/71 with RLM 65 underneath. The spinner tip appears to be yellow and the aircraft also carries the distinctive unit badge on the nose.





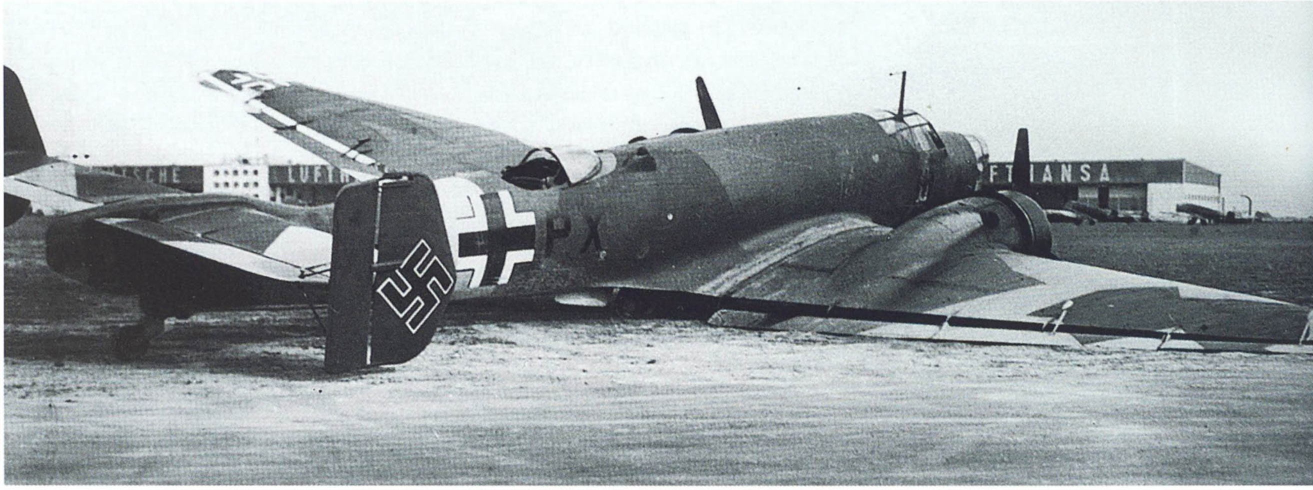
LNSchule Prague-Ruzyne Badge





FFS (C) 16 Badge

Junkers Ju 86 E coded SE+PX, still wearing the pre-war three-colour camouflage scheme, after a landing accident in August 1942 at Prague-Ruzyne. The barely discernible emblem under the cockpit is that of FFS (C) 16. Note the Lufthansa hangar in the background and and two more Ju 86 aircraft.



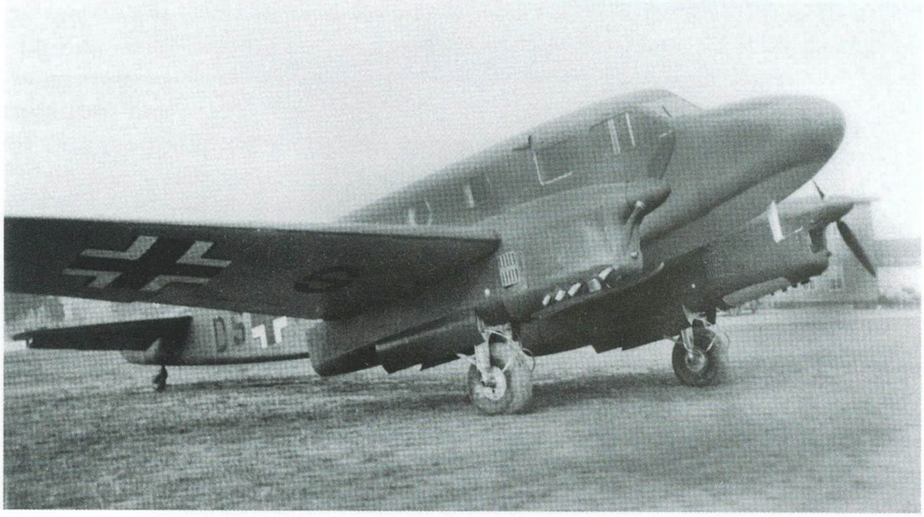
Caudron C.445 *Göeland* (Seagull)

A twin-engined low-wing monoplane with accommodation for up to six passengers and a crew of two, the Göeland was one of the most successful products of the French Caudron Company in the interwar period. Built almost entirely of wood except for the aluminium nose cone and the fabric covering to the fuselage sides, with an undercarriage which retracted into the engine nacelles, the prototype C.440 first flew in 1934. During the next three years the type proved to be an exceptional aircraft and gained acclaim in several air races.

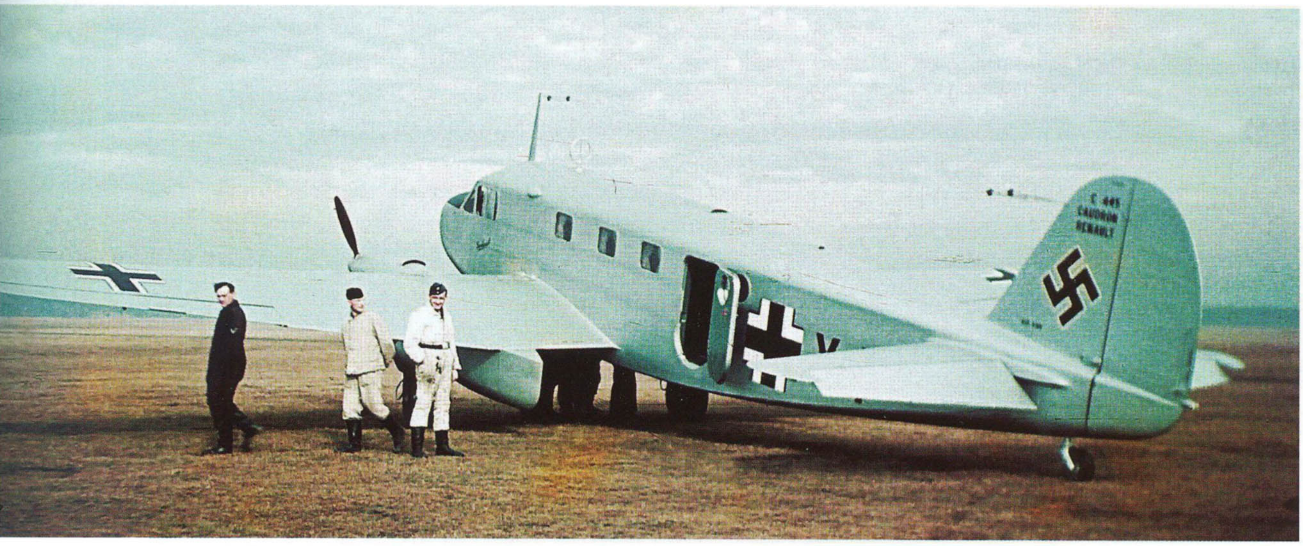
Several versions of the Göeland were built, essentially differing only in the degree of wing dihedral and the engine installation. An interesting point about the type is that the engines both rotated outwards, thereby cancelling out torque effects. As far as is known, all aircraft were fitted with one type or another of Renault in-line engine; the C.445M trainer, produced for the *Armée de l'Air*, was powered by a pair of 220 hp Renault 6 Pdis. After the occupation of France, production continued for both the Vichy Government and the *Luftwaffe*. Most war-time models were built by Renault at their Billancourt plant. Little is known about the C.445 in *Luftwaffe* service, although large numbers were produced for them, FFS B 20 being one known user. Production continued post-war and eventually some 1,702 were built.

Specification

Span:	17.60 m (57 ft 9 in)
Length:	13.80 m (45 ft 3 3/4 in)
Loaded weight:	3,500 kg (7,700 lb)
Max speed:	300 km/h (186 mph)



An overall dark green Caudron C.445A-1 in Luftwaffe service. Over 1,200 of these light twins were produced both before, during and after the war, and they saw extensive service with the Luftwaffe as trainers, communication and ambulance aircraft. The example here, DS+?? is probably in use with a B or C school.



This Caudron C.445, is believed to be W.Nr. 481/9217, CD+YF, in service with the Luftwaffe. It appears to have been painted in RLM 65 all over. No further details are known.

The first ominous signs in the breakdown of bomber crew training began at the same time as the fighter training programme was being reorganised. Initially, a temporary shortage of aviation fuel led to restrictions in the number of flying hours in bomber training. Shortly afterwards, the catastrophe at Stalingrad proved to be a turning point for the bomber force, when the loss of so many instructor pilots and aircraft led first of all to a severe hiatus in the flow of pupils through the bomber schools and then to an enforced restructuring of the whole training programme.

As an emergency measure, bomber pilots were no longer to be trained on multi-engined aircraft at schools, but were to learn their trade, on the job as it were, by flying as second pilots on Junkers Ju 52/3m transport aircraft. Apart from the immediate loss in efficiency of the transport squadrons, the disruption caused a surplus of partly-trained pupils in the A/B schools, and a shortage of fully trained crews ready to move from the advanced training schools into the reserve squadrons. In response to this crisis, the specialist bomber schools were therefore disbanded and their function dropped onto the reserve training units of the operational bomber *Geschwader*. This was exactly the opposite approach to the fighter squadrons, yet was doomed to failure for precisely the same reasons that the method had had to be abandoned by their fighter comrades, namely, that they had insufficient numbers of trained instructor pilots and aircraft. The result of this was that the partly trained pupils were sent directly to the operational units themselves, whereupon the effectiveness of the squadrons was immediately compromised – losses in men and machines escalated, and the offensive power of the bomber force was rendered largely impotent.

Despite the equipment shortages, in 1942 a rather more logical approach to training in the 'C' schools was attempted when an effort was made to reduce the number of aircraft types in use at any one school. The intention was that this should more accurately reflect the proportion of those aircraft in front-line service and streamline the flow of crews. (*See Table left*).

FFS C: 3, 6, 8, 9, 11, 14, 16, 18	Junkers Ju 88
FFS C: 10, 12, 13, 15, 19, 20, 21, 22	Heinkel He 111
FFS C: 4, 5	Dornier Do 217
FFS C: 1	Junkers Ju 52
FFS C: 15	Heinkel He 177

As a consequence of the wholesale reorganisation forced upon the *Luftwaffe* training system in 1943, however, on 15 October that year most of the 'C' schools were redesignated FFS 'B', retaining the same number as before. For example, FFS C 2 became FFS B 2. This was an acknowledgement that the *Luftwaffe*'s most pressing need was for fighter pilots and an indication of the rapidly declining strength of the bomber force which was being frittered away piecemeal. Indeed, by late 1943 the system was almost incapable of producing pilots trained to fly in all weathers.

Eagles in the mist

Before he could qualify for the coveted 'C' licence, the trainee needed to learn the methods and techniques of warfare which would make him an effective military pilot. In particular, the demands imposed upon bomber, reconnaissance, transport and naval pilots and crews, who were all obliged to fulfil their allotted tasks in all types of weather, led to the early establishment of blind and all-weather flying training schools. The first of these had been formed at Celle in 1934 under the cover name *Fliegerschule des DLV*, Zweigstelle Celle/Wietzenbrueck. By September 1939 there were five *Blindflugschulen*, (BFS), as listed in Table 11. Significantly, even under the stimulus of all-out war, there were never more than a dozen or so of these schools.

It can be seen that the blind-flying schools also fell victim to the upheavals in the training system in October 1943, most of them being renumbered as 'B' schools and contracting the syllabus to B1-B2 level.

Table 11: **Luftwaffe Blind Flying Schools**

School	First Formed	As BFS	Main Bases	Comments
BFS	Celle 1934		Celle	To FFS C Prague-Ruzyne (later C 12) September 1939.
BFS 1	October 1935	January 1940	Brandis, Werl, Mörtitz	As B 31 from October 1943. Closed April 1945.
BFS 2	November 1938	January 1940	Neuburg/Donau, Stargard, Brünn	As B 32 from October 1943. Closed January 1945.
BFS 3	November 1939	January 1940	Königsberg, Strasburg, Grieslienen, Prague/Ruzyne	As B 33 from October 1943. Closed March 1945.

School	First Formed	As BFS	Main Bases	Comments
BFS 4	November 1939	April 1940	Wien/Aspern, Copenhagen-Kastrup	Transport pilots school. As B 34 from October 1943. Closed February 1945.
BFS 5	October 1939	October 1940	Rahmel, Marienburg, Stargard, Belgrade, Mielec, Hagenow	As B 35 from October 1943. To JG 115 June 1944 for night-fighter crew training.
BFS 6	October 1940	October 1940	Radom, Wesendorf	As B 36 from October 1943. To JG 110 July 1944.
BFS 7	November 1940	November 1940	Insterburg, Oslo, Radom, Braunschweig-Waggum	From BFS 6, summer 1941. As B 37 from October 1943. To JG 116, September1944.
BFS 8	September 1941	September 1941	Stargard, Terespol, Seerappen, Gabbert, Langensalza	From BFS 5. As B 38 from October 1943. Trained heavy transport crews. Closed February 1945.
BFS 9	April 1943	April 1943	Kaunas, Insterburg	Instructors taken for transport service September 1943 and school closed.
BFS 10	May 1943	May 1943	Altenburg, Pomssen	From A/B 33. School for *Wilde Sau* night-fighter pilots. To JG 110 October 1943.
BFS 11	July 1943	July 1943	Stubendorf	From A/B 111. Special night ground attack pilot school. To SG 111 October 1943.

SHARPENING THE TALONS

In the same way that a fighter pilot had to be more than an aerial chauffeur in order to be militarily effective, so the prospective bomber pilot or crew member needed to learn the military tactics and skills appropriate to his calling. The last stage of training before a pilot was posted to an operational unit was a spell at a weapons school (or at least this was the intention until the reorganisation of training in 1943). Having a similar function to an RAF OTU (Operational Training Unit), the first three of these *Grosse Kampffliegerschulen* – Large Bomber Schools – were already in existence in September 1939, KFS 4 being re-formed in early 1940 in newly occupied Poland. Also known as *Waffenschulen* – Weapons Schools – it should be noted that in line with the German system of training entire crews, these units also trained observers, radio operators and air gunners.

Table 12: **Luftwaffe Bomber Schools**

School	First Formed	As KFS	Main Bases	Comments
KFS 1	May 1935	January 1940	Tutow	Closed October 1942
KFS 2	May 1935	January 1940	Fassberg, Hörsching	Closed August 1942
KFS 3	March 1934	January 1940	Lechfeld, Warsaw-Okecie, Barth, Greifswald	Closed September 1942
KFS 4	November 1939	January 1940	Thorn (Torun), Graudenz	Closed October 1942
KFS 5	February 1941	February 1941	Parow,*	Closed November 1943

*Parow was also home to a weapons school, *Fliegerwaffenschule (See)* 3, Dievenow, used by maritime air units)

Ground Attack Schools

In keeping with their specialist roles, there were other types of flying training schools, notably the *Stuka Vorschulen* and *Stuka Schulen* for potential dive-bomber crews. Brief details of the type of training given there were described earlier. However, the changing nature of air warfare meant that the technique of precision dive-bombing of ground and naval targets gradually began to give way to less hazardous methods. Subsequently, the conversion of the operational dive-bomber units from the venerable Ju 87 onto the totally different Hs 129 and ground-attack versions of the Fw 190 eventually led in October 1943 to the wholesale redesignation of the dive-bombing units of the *Luftwaffe* from *Stuka* to *Schlacht* – literally 'Battle' i.e. ground attack. The new equipment demanded a very different training syllabus and the *Stuka* schools were accordingly modified and renamed *Schuleschlachtgeschwader.* These units, in line with later *Luftwaffe* training policy, were semi-operational and their designations reflected this. Favourite aircraft of the initial training units were the Hs 123 and He 50 biplanes and early models of the Ju 87.

Table 13: **Luftwaffe Main Ground-Attack Schools**

Unit	First Formed	Main Bases	Comments
Stuka Vorschule	1 September 1941	Bad Aibling	With A/B 117 from November 1942.
Stuka Vorschule	2 September 1941	Bad Aibling, Piacenca	Closed November 1942.
Stuka Schule	1 April 1939	Kitzingen, Wertheim	As StG 101 from December 1942.
Stuka Schule	2 December 1939	Otrokowitz, Graz, Foggia	As StG 102 from February 1943.
StG 101	December 1942	Wertheim, Cuers, Metz	Closed October 1943.
StG 102	February 1943	Paris-Orly	As SG 102 from October 1943.
SG 101	February 1943	Reims, Wischau, Paris-Orly, Brünn	Closed April 1945.
SG 102	October 1943	Paris-Orly, Deutsch-Brod, Hohensalza	Closed February 1945.
SG 103	October 1943	Metz, Biblis, Fassberg	Closed April 1945.
SG 104	August 1944	Tutow, Aalborg-West	Closed April 1945.
SG 111	October 1943	Stubendorf, Ludwigslust	From BFS 11. Closed at Grossenbrode March 1945.
Night Ground Attack Schools			
StG 151	August 1943	Agram, Pancevo	9. *Staffel* as 3./SG 5 from October 1943. Remainder as SG 151 December 1943.
SG 151	December 1943	Agram, Oels, Grove	*Staffeln* scattered January 1944. All closed April 1945.
I./SG 152	November 1943	Deblin-Irena, Prossnitz, Rahmel	Absorbed by SG 151 August 1944.

Not listed here are the *Erganzungs Staffeln* of the main operational *Stuka Geschwader*

Eyes for the Eagles

Associated with the 'C' schools were the various specialist schools where the requisite skills necessary for other crew members were taught. Among these were the vitally important training schools for reconnaissance pilots and observers – the *Aufklärerschulen.* The operational units which these schools served were divided into two broad types based on their primary functions, namely *Nahaufklärer* – tactical or close reconnaissance in support of operations by the army in the field (known as Army Co-operation in the RAF), and long-range *Fernaufklärer* carrying out strategic missions in support of operational planning. Included in this category were the highly specialised weather reconnaissance crews. Ideally, future reconnaissance crews were selected and trained as such. For the first time they were exposed to aircraft fully equipped with an abundance of special equipment including automatic and hand-held cameras, drift-sights, etc. In addition, the special flying techniques so necessary in aerial photography were taught here.

Table 14: **Main Luftwaffe Reconnaissance Schools**

School	First Formed	Main Bases	Comments
Aufklärungsschule Hildesheim	July 1934	Hildesheim, Brieg	As AS 2 from January 1940.
Aufklärungsschule	1 January 1940	Grossenhain	As I.(F)/101 from February 1943.
Aufklärungsschule	2 January 1940	Brieg	From AS Hildesheim. As NAG 102 from February 1943.
Aufklärungsschule	3 September 1939	Jüterbog, Gotha, Ludwigslust, Perleberg	As FAS 3 from October 1942, then as II./FAG 101.
FAG 101	February 1943	Perleberg, Grossenhain	Closed February 1945.
NAG 102	February1943	Jüterbog, Brieg	I./NAG 102 to JG 105 8 August 1944. 3. *Staffel* to JG 110. 4. *Staffel* to NAG 103 1944. Remainder closed between September 1944-February 1945.
AG 103	February 1945	Jüterbog, Perleberg	All parts closed March 1945.

Main aircraft equipment of these schools was a selection of He 45, He 46, He 70 and Hs 126 single-engined aircraft and Do 17, Bf 110, Ju 86 and Ju 88 twin-engined machines. Oddly, only a handful of the Fw 189, one of the mainstays of the operational short-range reconnaissance squadrons, saw service with the training schools. Later in the war far more potent aircraft, such as camera-equipped versions of the Bf 109, Fw 190 and the jet-powered Me 262 and Ar 234 were necessary to stand any chance of accomplishing missions.

Heinkel He 45

Originally conceived as a general-purpose light bomber in response to a requirement of the clandestine *Luftwaffe* in 1930, the cumbersome He 45 was a typical Heinkel product of the time; a rugged, but unimaginative two-seat biplane design, powered by a single 750 hp BMW VI liquid-cooled engine driving a massive two-bladed wooden propeller. The fuselage was of welded tubular steel with metal panels covering the upper fuselage decking and engine, while the remainder and the all-wooden wings were fabric covered. Three prototypes flew in spring 1932: the He 45a, He 45b and He 45c. A production order for 418 unarmed He 45 A and 90 He 45 B models equipped with one fixed forward-firing MG 17 and one MG 15 on a ring mounting for the observer followed in the autumn of 1932. Most aircraft were built by Focke-Wulf and BFW owing to lack of space at Heinkel's Warnemünde factory.

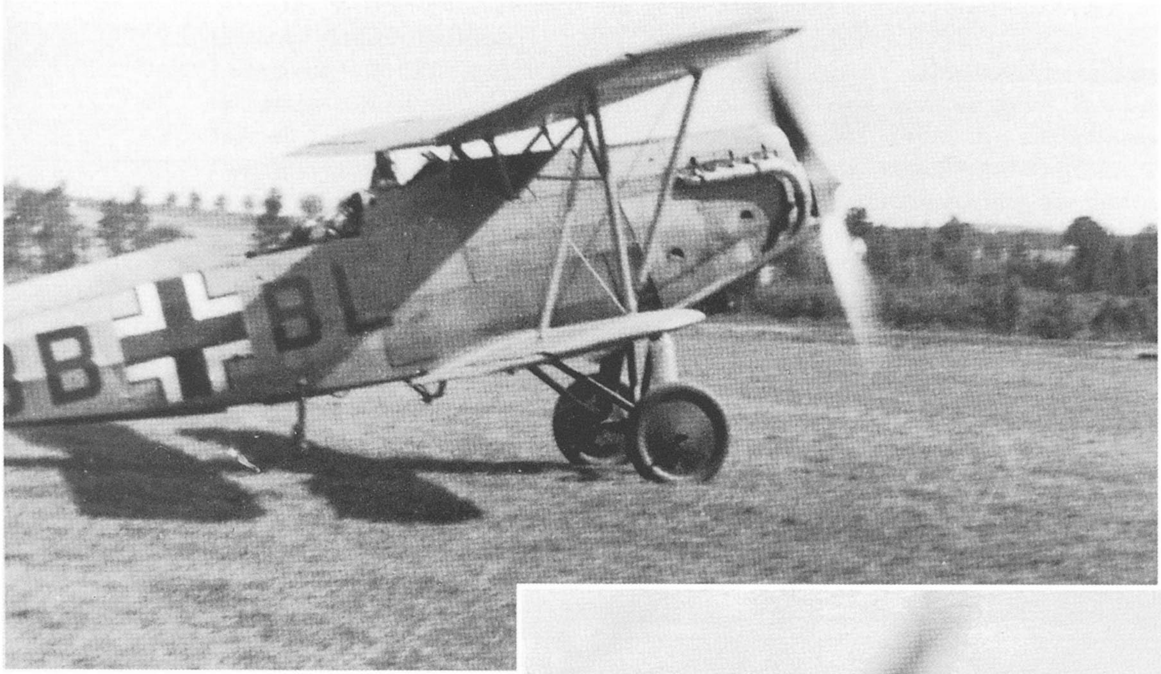
By 1934, with better bomber aircraft available, the He 45 was issued instead to the reconnaissance units where it gave adequate if uninspired service. Numerically, it was probably the most important aircraft in the *Luftwaffe* inventory at the time.

Experience in Spain during the Civil War ensured that by the outbreak of World War II all but 21 of the surviving aircraft of the type were in training units, where their rugged construction was of considerable value. FFS A/B 24 is just one training school known to have used the He 45.

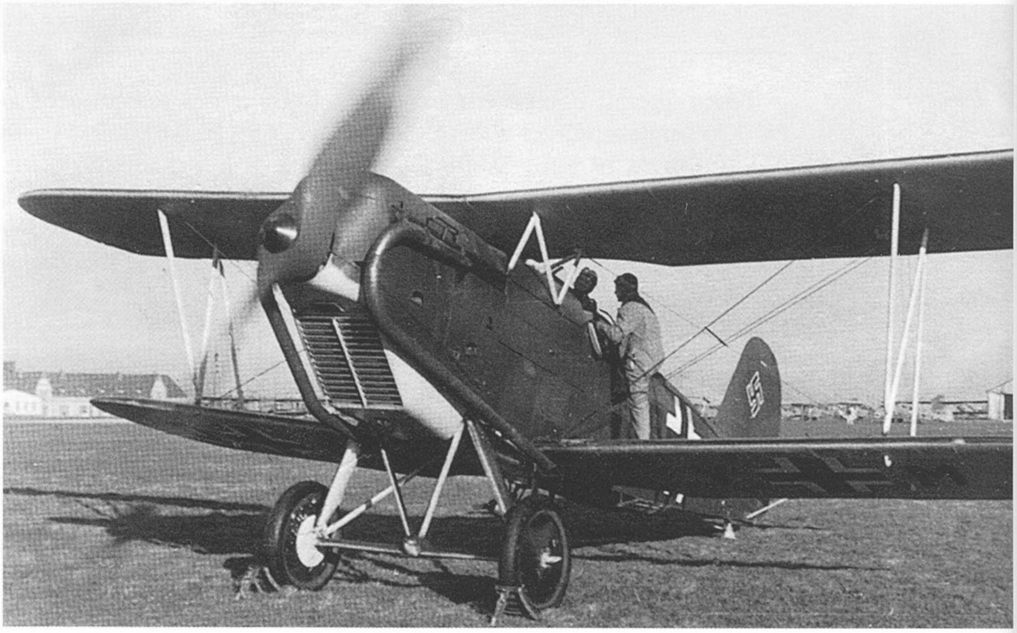
Specification

Span:	11.50 m (37 ft 8$\frac{3}{4}$ in)
Length:	10.00 m (32 ft 9$\frac{3}{4}$ in)
Loaded weight:	2,745 kg (6,053 lb)
Max speed:	290 km/h (180 mph

Port side view of an immaculate Heinkel He 45 coded SP+AB, in training school service. The date and location are unknown.

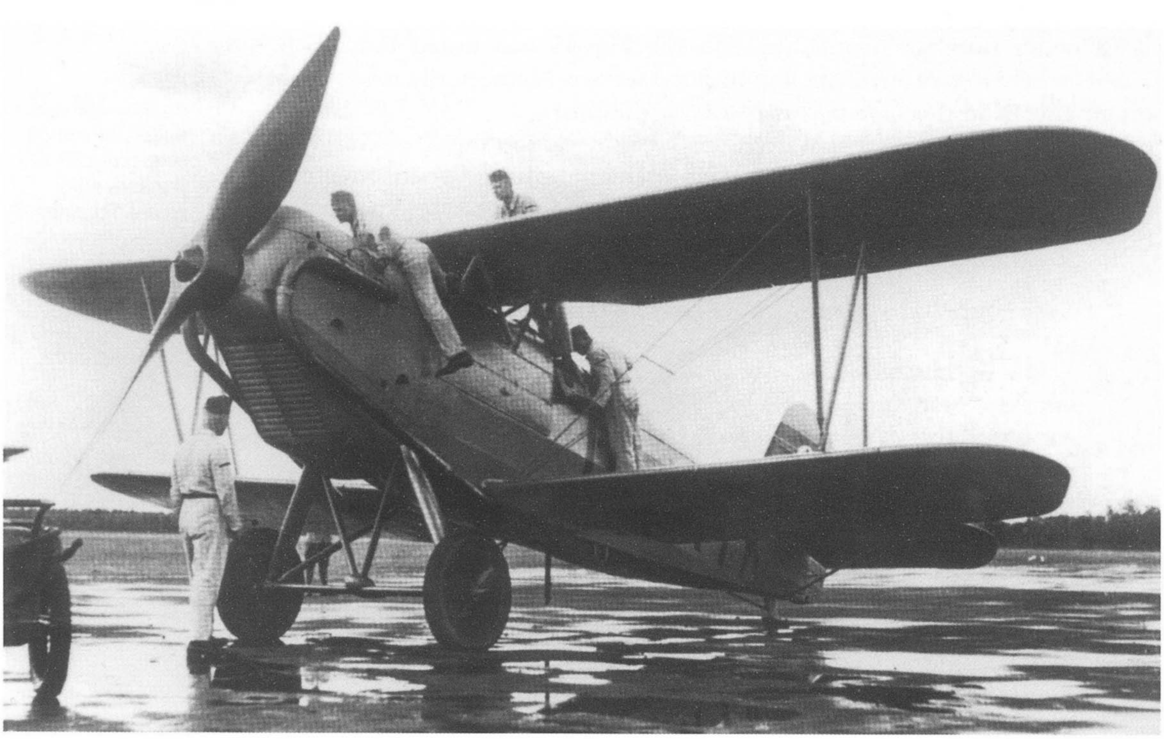


An overall RLM 02 Grau Heinkel He 45 trundles out for another training flight. It is not known what unit, or when, BB+BL belonged to.



A Heinkel He 45 runs up its engine prior to a flight. Coded DB(?)+YM, the machine wears an unusually bright colour under the engine cowling, possibly newly-applied yellow. A very similar aircraft coded DB+YB was in use with Aufklärungsschule 2 at Brieg, which may be a clue as to which unit this one belongs to.

Ground crew make final checks on this He 45 before a flight. Note that the aircraft still has the pre-war tail marking of a black swastika on a white circle superimposed on a red band.



Heinkel He 46

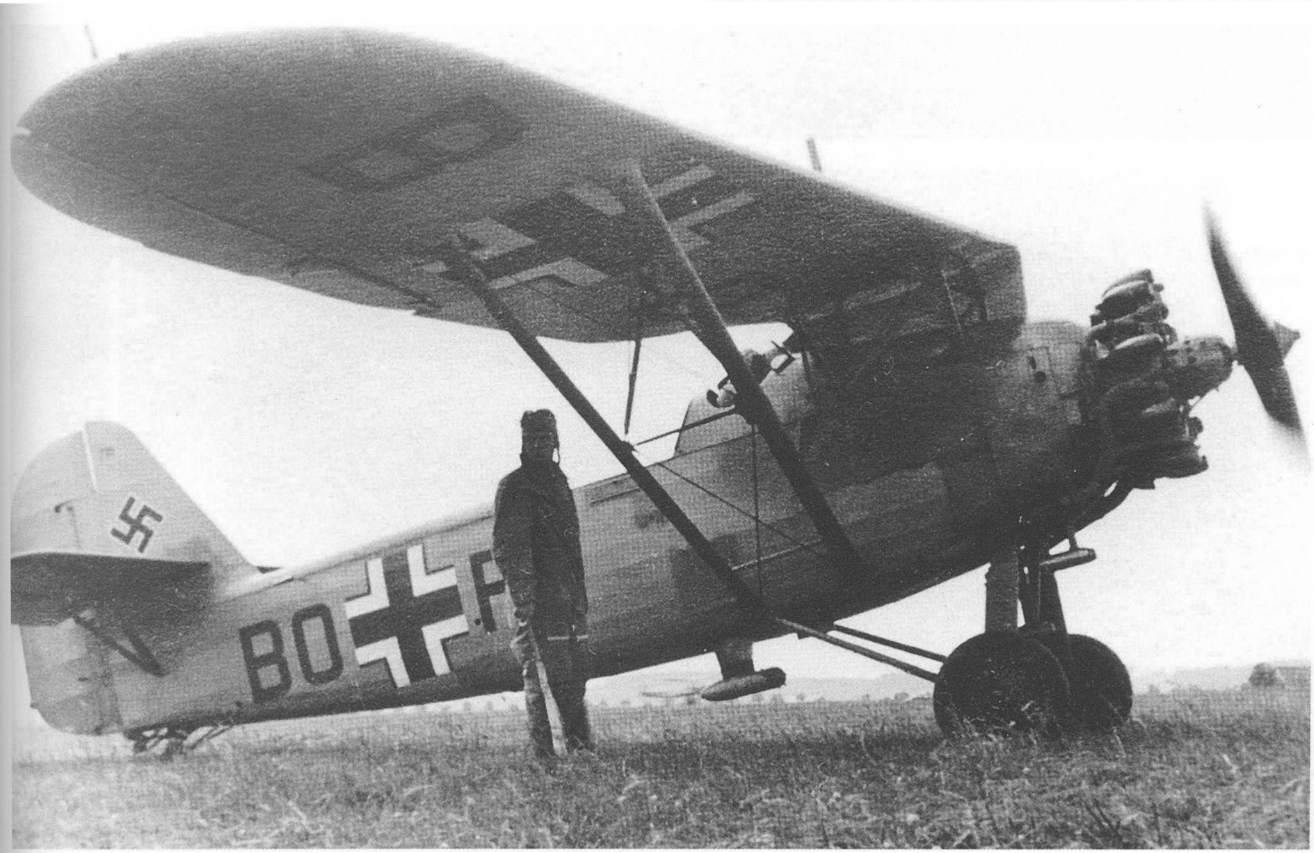
Another of the first generation of aircraft for the newly-emergent *Luftwaffe*, the He 46 was unusual in that the prototype He 46a was a biplane, while the production versions were parasol monoplanes! Built in 1931 in response to an RWM requirement for a two-seat open cockpit tactical reconnaissance and army cooperation aircraft, early trials proved both that the machine was underpowered and the lower wing seriously impaired the observer's view. Consequently, the third of three prototypes was built as a monoplane with strut-braced wings, powered by a 660 hp Bramo 322 B radial engine and armed with a moveable MG 15 machine gun for defensive purposes by the observer. Following conventional Heinkel practice, the mixed steel and wooden structure was covered mostly in fabric.

After official acceptance, production of the first 371 He 46 C-1s began at Warnemünde in 1933. This version could carry either a camera or up to 200 kg of small bombs in an under-fuselage bay. The pressures upon Heinkel were such that sub-contractors such as Fieseler and Gotha were needed to ensure that deliveries began in early 1935. Six D-series aircraft, differing only marginally from the C-1, were built followed by the E model which differed most obviously from other series by being fitted with a cowling for the radial engine. Problems with the engines meant that these cowlings were usually removed in *Luftwaffe* service, although fourteen unarmed He 46 F-1 and F-2 models for training, powered by 560 hp Armstrong Siddeley Panther engines, retained theirs.

By 1936 the *Nahaufklärerstaffeln* were completely equipped with the He 46, some of the last examples produced going to Bulgaria (18 C-2s) and Hungary (36 E-2Un). About thirty were sent for trials in Spain, where they suffered heavy casualties in the Civil War. From the spring of 1938, the He 46 began to be replaced by the Henschel Hs 126 and by September 1939 only a few survived in front-line *Luftwaffe* service. Most of the remaining machines were sent to the training schools, the graveyard of many a *Luftwaffe* aeroplane, although in 1943 a number were pressed into service for night-harassing operations with the *Nachtschlachtgruppen* on the Eastern Front.

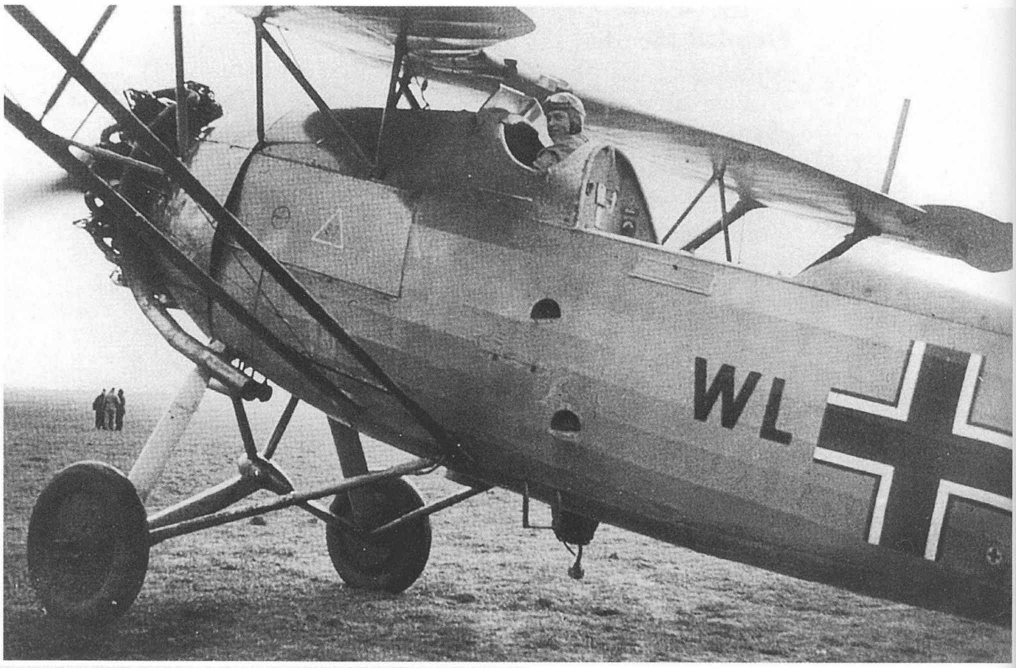
Specification

Span:	14.00 m (45 ft 11 in)
Length:	9.50 m (31 ft 2 in)
Loaded weight:	2,300 kg (5,071 lb)
Max speed:	250 km/h (155 mph)

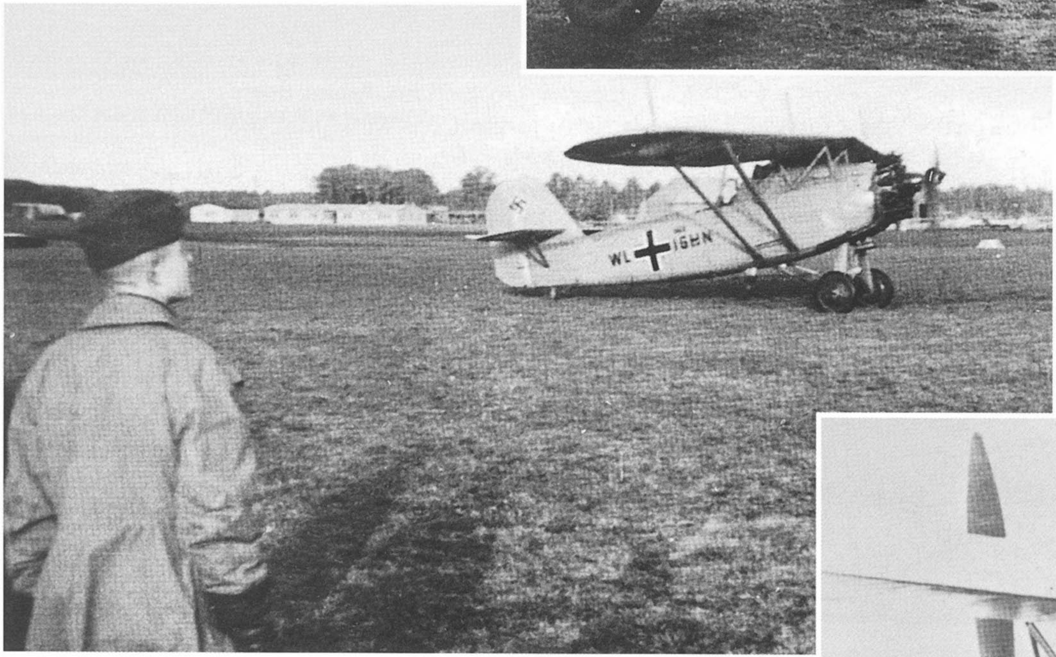


Unknown flight trainees and Heinkel He 46 coded BO+P?, possibly W.Nr. 729(?), being readied for flight. Unit and location is believed to be FFS A/B 117, Kamenz 1940.

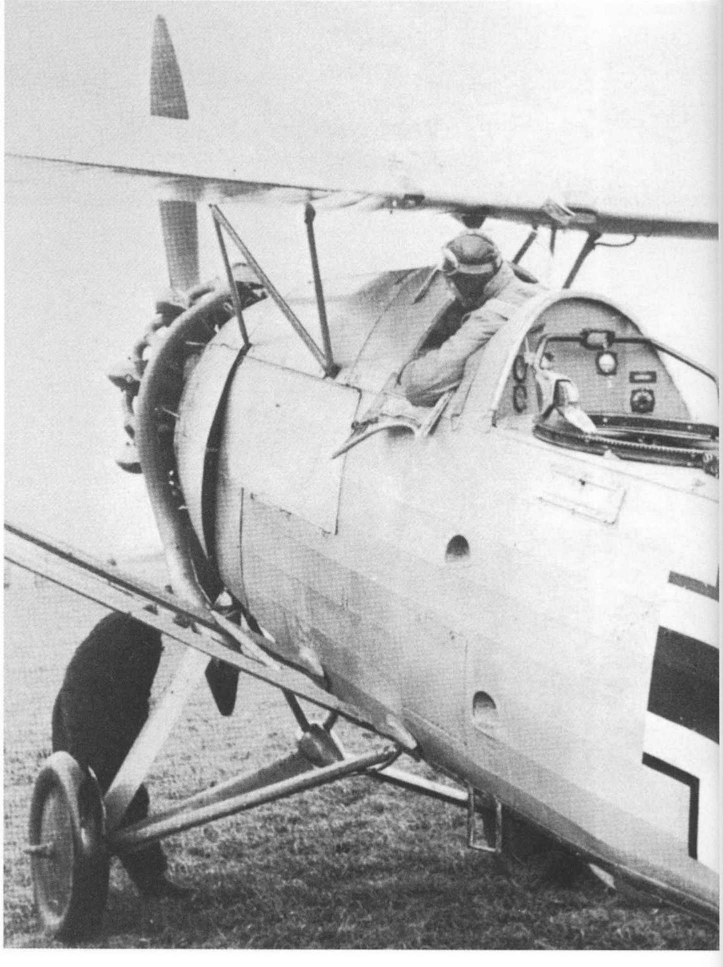
Possibly the same aircraft as in the photograph below, this shows the massive size of the He 46 to advantage. The aircraft was used by Sch/FAR 22 in Neustadt-Glewe during late 1939 or spring 1940.



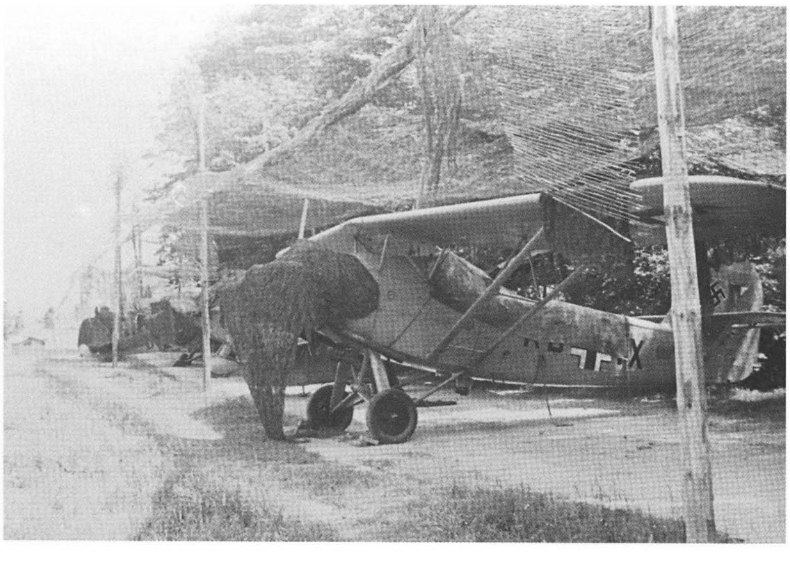
A He 46 with the early Luftwaffe code WL-IGHN, possibly W.Nr. 367, finished in overall RLM 02 Grau. The aircraft was in use with Sch/FAR 22, Neustadt-Glewe, spring 1940.



A mechanic makes a final check of the undercarriage and engine on this He 46 before the pilot gets ready for a flight. Note the empty gun rail in the rear cockpit.



He 46 coded KB+IX under camouflage netting with other light aircraft at the DVS in Braunschweig where it may have been used for glider-towing training.



Other Units

So far, little has been said of the other essential members of multi-engined aircraft in the *Luftwaffe*. As indicated earlier, there were specialist schools for training navigators (*Beobachter*), radio operators (*Bordfunker*), flight mechanics (*Bordmechaniker*) and gunners (*Bordschützen*). Essentially, these formed sub-sections within the *Kampfflieger* schools noted previously.

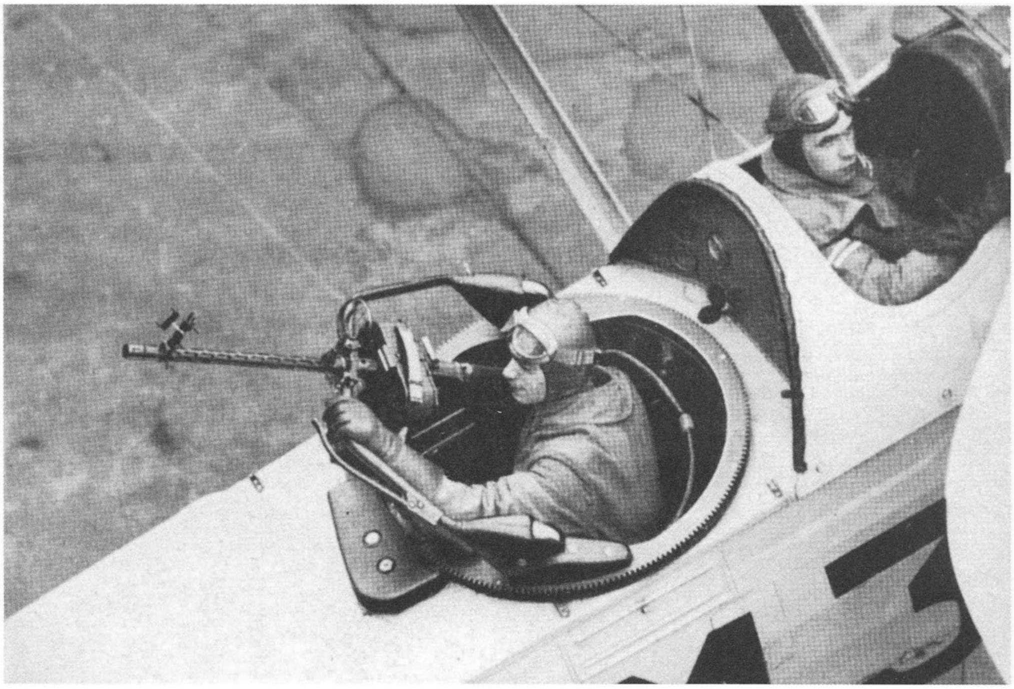
Navigator (KBVS/KBS) Schools

School	First Formed	As KBS	Main Bases	Comments
KBVS 1	October 1942		Tutow	Closed March 1943.
KBVS 2	October 1942		Bug, Stolp-Reitz	Closed January 1943.
KBS 1	March 1943	March 1943	Thorn, Hohensalza	Closed September 1944.
KBS 2	August 1942	August 1942	Hörsching, Malacky	Closed December 1944.
KBS 3	September 1942	September 1942	Tutow	Closed August 1944.
KBS 4	November 1943	November 1943	Parow	Closed October 1944.

There was also a specialist air-gunnery school formed at Stolp in mid-1940 before dispersing to Rahmel in January 1942, then moving to Graudenz in Poland between September 1942 and January 1943. In the face of the Russian advances, the school was obliged to close for good in late 1944. Additionally, on account of their highly technical operations, there were a number of *Luftflottennachrichtenschulen* (Signals Schools/LNS), as listed below. These were mostly formed immediately pre-war, but all had closed by late 1944 or early 1945.

Briefly, the time to train a navigator was some six months, with that for a radio operator being a year. Eventually, the individual members were assembled at the *Waffenschulen* as a complete crew, where they carried out plotted flights, by day and night, formation flying and bombing exercises. They were then posted together to their operational unit. The radio and navigation schools in particular made extensive use of the ubiquitous Junkers W 34, Siebel Si 204 and Focke-Wulf Fw 58, whose roomy fuselages made ideal flying classrooms. The Fw 58 also served as an air gunnery trainer.

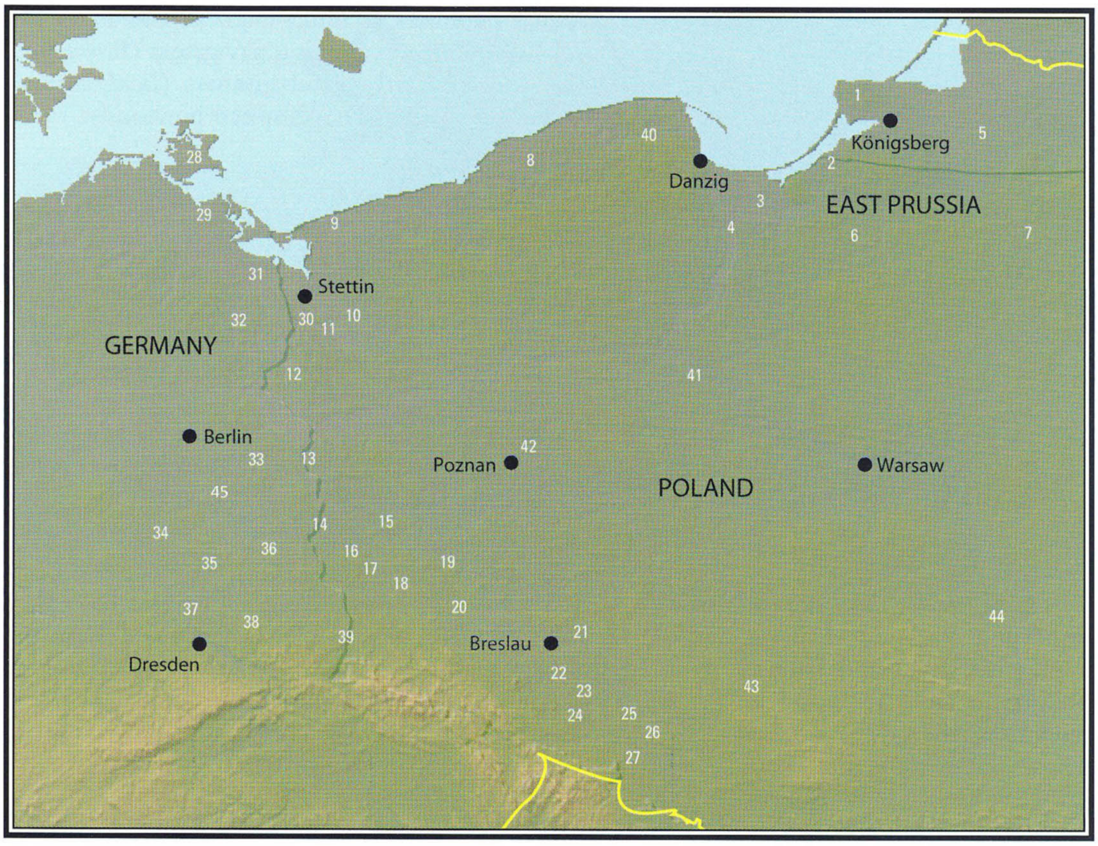
Unit	Main Bases Used
LNS	Halle/Saale
LNS 1	Nordhausen
LNS 2	Königgrätz
LNS 3	Pocking, Gablenz, München-Reim
LNS 4	Budweis, Deutsch-Brod, Lyons
LNS 5	Erfurt
LNS 6	Dievenow (Land/See)
LNS 7	Dresden-Klotzsche
LNS 8	'Prinz Eugen' Detmold



This He 46 is being used for aerial gunnery training. The seat behind the pilot has been fitted with a gun rail with an MG 15, 7.92 mm calibre machine gun.

Luftwaffe Training Unit Bases in Eastern Germany and East Prussia

1. Neukuhren
1A Seerappen
2. Heiligenbeil
3. Elbing
4. Marienburg
5. Insterburg
6. Allenstein
7. Lyck
8. Stolp
9. Dievenow
10. Stargard
11. Neumark
12. Königsberg
13. Frankfurt-am-Oder
14. Guben
15. Rothenburg
16. Sorau
17. Sagan
18. Sprottau
19 Glogau
20. Lüben
21. Oels
22. Ohlau
23. Brieg
24. Grottkau



25. Oppeln
26. Stubendorf
27. Gleiwitz
28. Garz
29. Greifswald
30. Altdamm
31 Pasewalk
32. Prenzlau
33. Fürstenwalde
34. Brandis
35. Finsterwalde
36. Cottbus
37. Grossenhain
38. Kamenz
39. Görlitz
40. Putzig/Rahmel
41. Thorn
42. Posen
43. Tschenstochau
44. Deblin
45. Alt-Lönnewitz

There are several other units whose exact locations have not been identified to date.

Focke-Wulf Fw 58 *Weihe* (Kite)

One of the true workhorses of the *Luftwaffe*, Kurt Tank's Fw 58 was the German equivalent to the Avro Anson. First flown as a six-seater civil transport in 1935, it rapidly developed into numerous military versions ranging from crew trainer to ambulance and even crop sprayer.

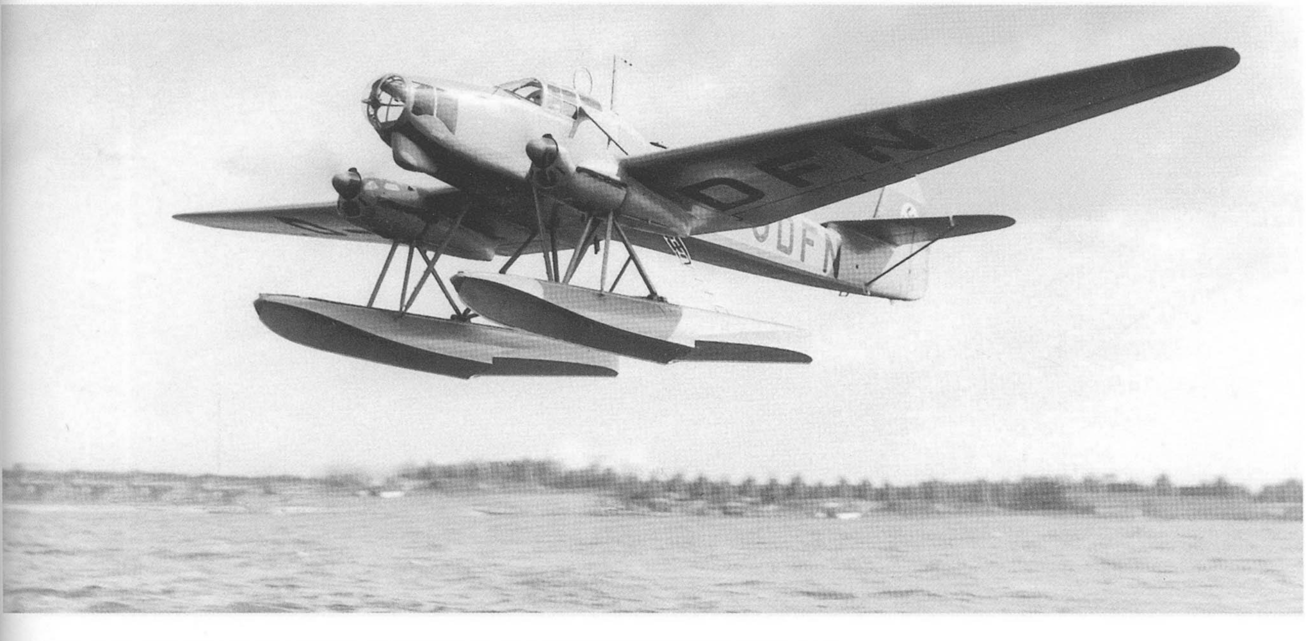
Apart from being the first Focke-Wulf aircraft to have a retractable undercarriage, the prototype, D-ABEM, which first flew in summer 1935, was an entirely conventional low wing monoplane built from steel tubing with a combination of wood, metal and fabric covering and powered by two 240 hp Argus As 10 C air-cooled engines. The very sturdy wing centre section was braced to the fuselage by single struts and an important feature was the ability to change the nose section for different roles. In the passenger V1 this was smoothly streamlined, while on the V2 military prototype provision was made for an open gun position. Only a few of the Fw 58 A, production version of the V2, were built before interest moved to the Fw 58 B. This was one of the main military versions and featured a glazed nose with a bubble mounting for an MG 15 machine gun and the ability to carry bombs. Some were completed as floatplanes known as the Fw 58 BW.

Main production centred on the Fw 58 C, a light transport with a solid nose and accommodation for six passengers. D-ALEX, one of the first of these, became Kurt Tank's personal aircraft, in which he was later unsuccessfully attacked by two Spitfires.

Known affectionately as the *Leukoplastbomber* ('elastoplast bomber') by German pilots, the Fw 58 saw considerable use in the training schools, as a light transport for the staff of operational squadrons and, not least, casualty evacuation. About 30 were specially modified to allow spraying of areas on the Eastern Front where there was a risk of disease to German troops. The '*Weihe*' was also exported to Argentina, Bulgaria, China, Holland, Hungary, Rumania and Sweden. Twenty-five were built under licence in Brazil.

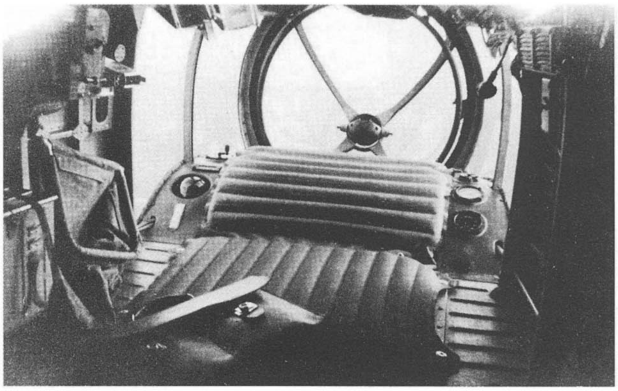
Specification

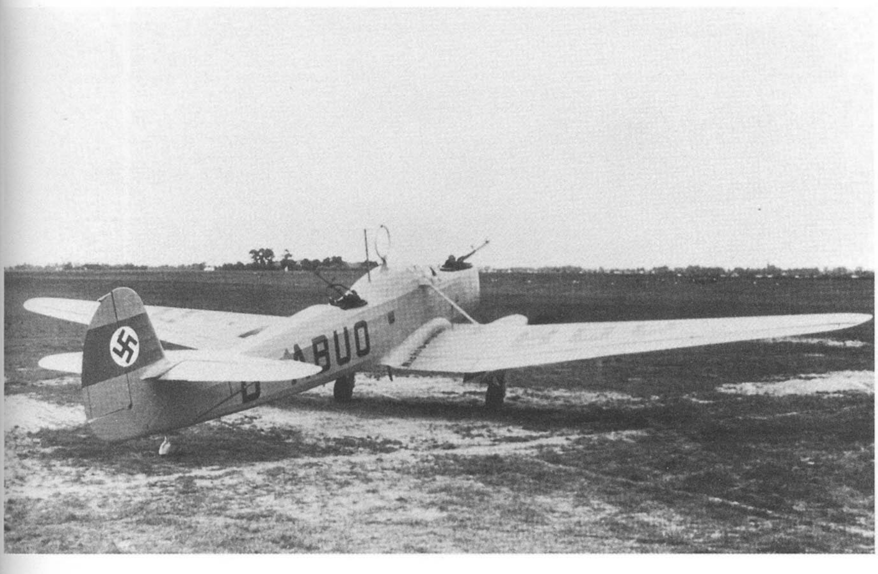
Span:	21.00 m (68 ft 10$\frac{3}{4}$ in)
Length:	14.00 m (45 ft 11$\frac{1}{4}$ in)
Loaded weight:	3,600 kg (7,936 lb)
Max speed:	273 km/h (170 mph)



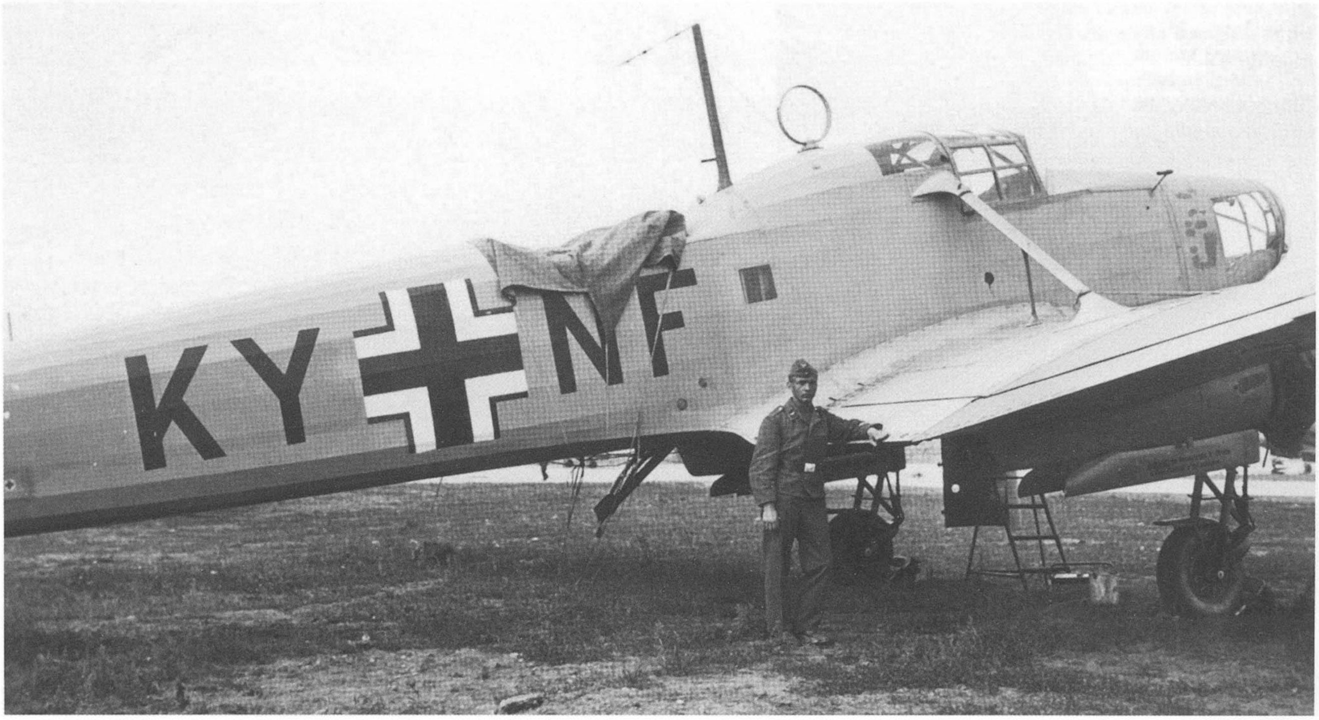
Intended to test the type as a marine trainer aircraft, the Fw 58 V9 coded D-ODFN, seen here, was a special version of the Fw 58 B. Apart from the floats, this was an updated version of the A-type and was fitted with a glazed nose incorporating a rotating Ikaria gun ring.

What the trainee bomb-aimer saw. View through the nose glazing of a Focke-Wulf Fw 58 B showing the Ikaria rotating gun mount also fitted to the Heinkel He 111.

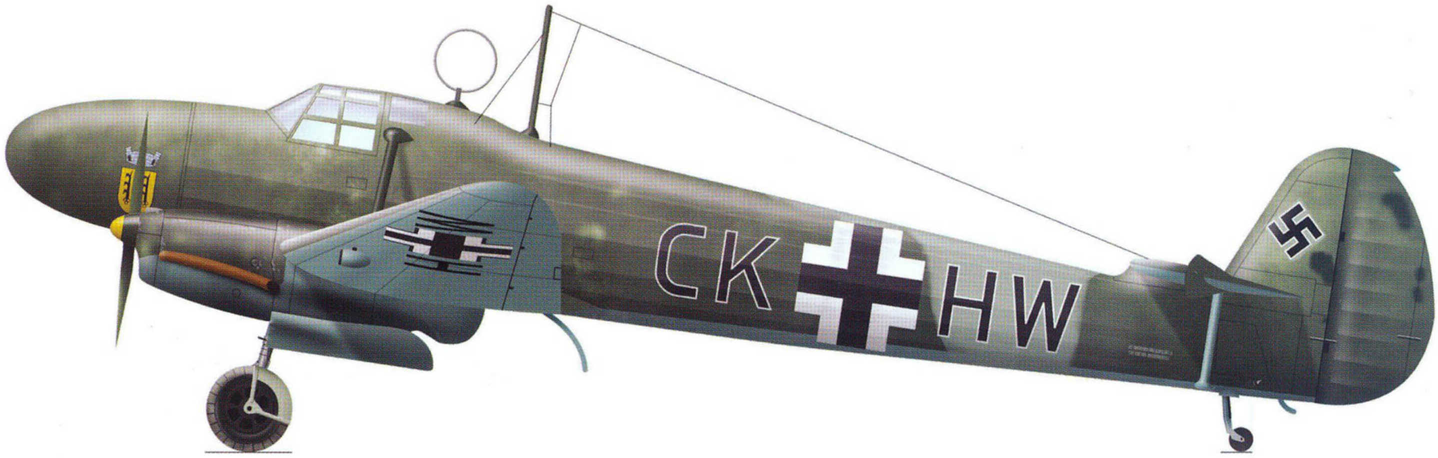




LEFT: This is the Focke-Wulf Fw 58 V3, D-ABUO, W.Nr. 802, clearly showing the gun positions. The type was intended for use as a military multi-purpose trainer from the outset, although only a few were built with the open gun ring in the nose. Hundreds were later built and quickly established themselves as one of the main Luftwaffe training types.

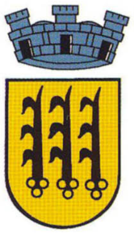


Focke-Wulf Fw 58 B, KY+NF, undergoing maintenance while with KFS 4 Thorn (Torun) Poland, 1940. The odd patches just behind the nose glazing are red primer paint after small repairs. Overall colour of this machine is RLM Grau 02.



Focke-Wulf Fw 58 C coded CK+HW of FFS A/B 23

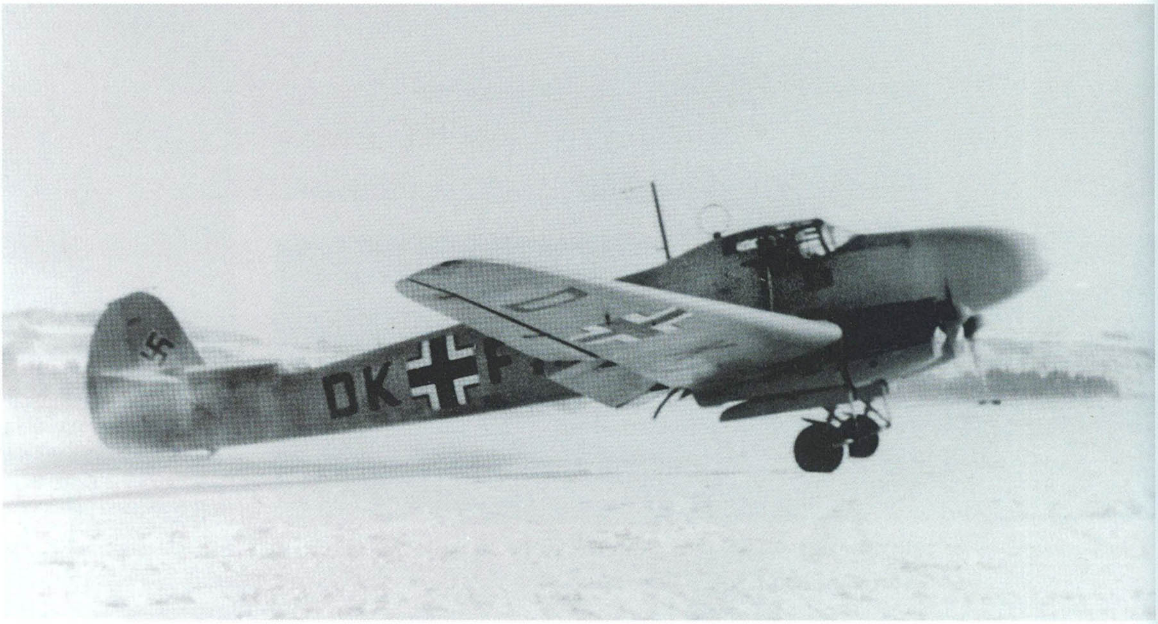
This Fw 58 C was originally with FFS A/B 121 in 1940 and was with FFS A/B 23 in December 1940. Note the large code letters oultined in white.

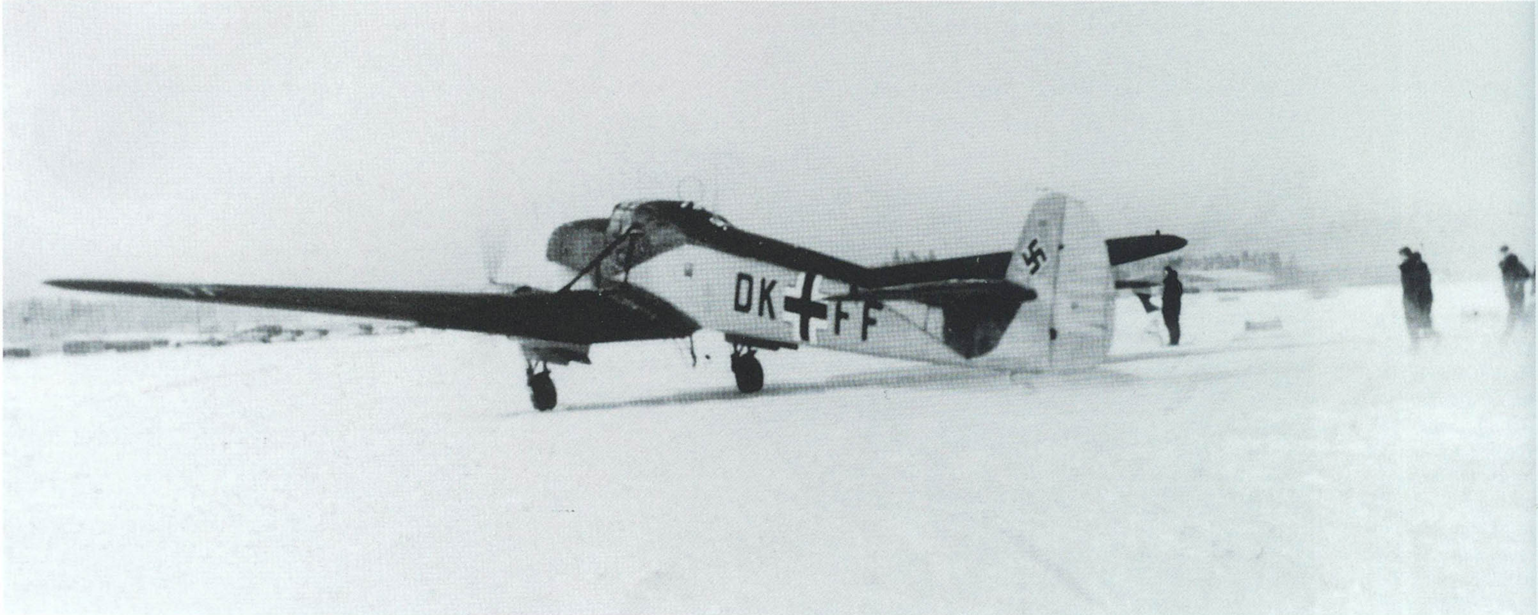


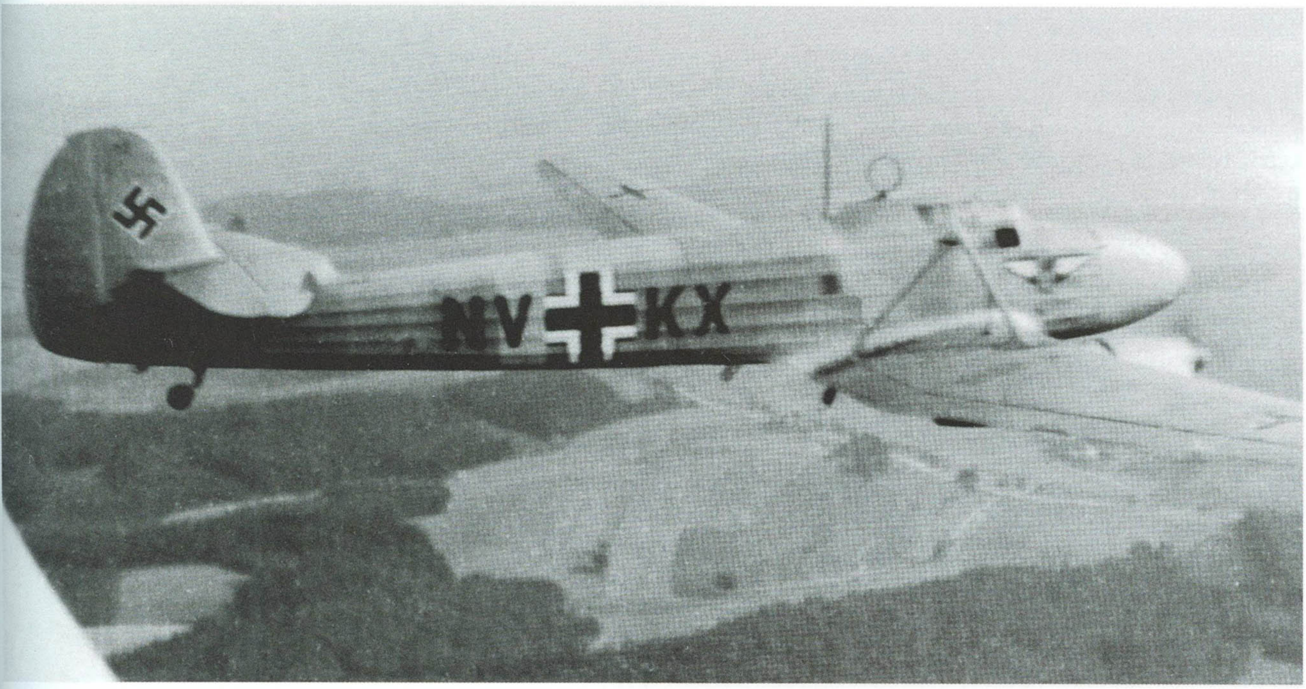
FFS A/B 43 Badge

RIGHT: Focke-Wulf Fw 58 C coded DK+FA taking off in the snow and possibly belonging to LKS 7.

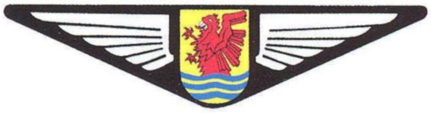
BELOW: Focke-Wulf Fw 58 C coded DK+FF, wears an unusually applied camouflage scheme of RLM 02 Grey overall with dark green, probably RLM 71, over the spine of the fuselage, the nose and on wing uppersurfaces. As a directive requiring all grey trainer aircraft to be painted dark green on the uppersurfaces was issued on 21 January 1942, the date is probably after that. Believed to belong to LKS 7 at Tulln, which operated a very similar machine coded DK+FE.



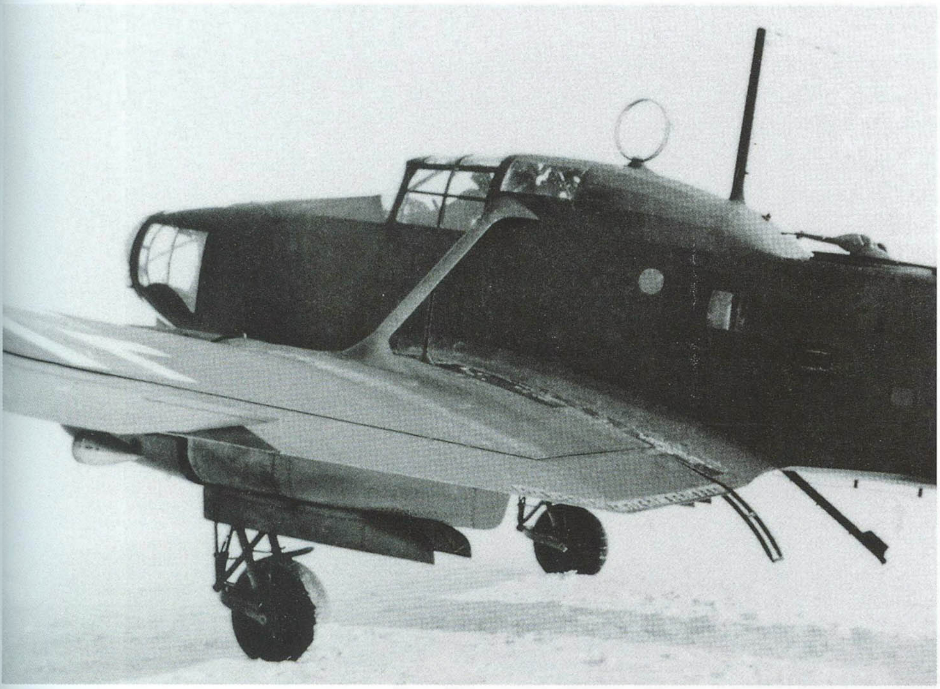




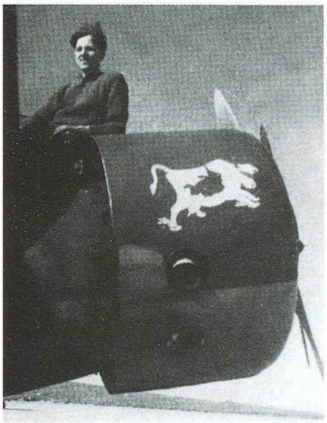
Focke-Wulf Fw 58 C coded NV+KX, finished overall RLM 02, with a yellow fuselage band and carrying the elegant winged griffon badge of FFS A/B 71, probably flying out from Proßnitz.



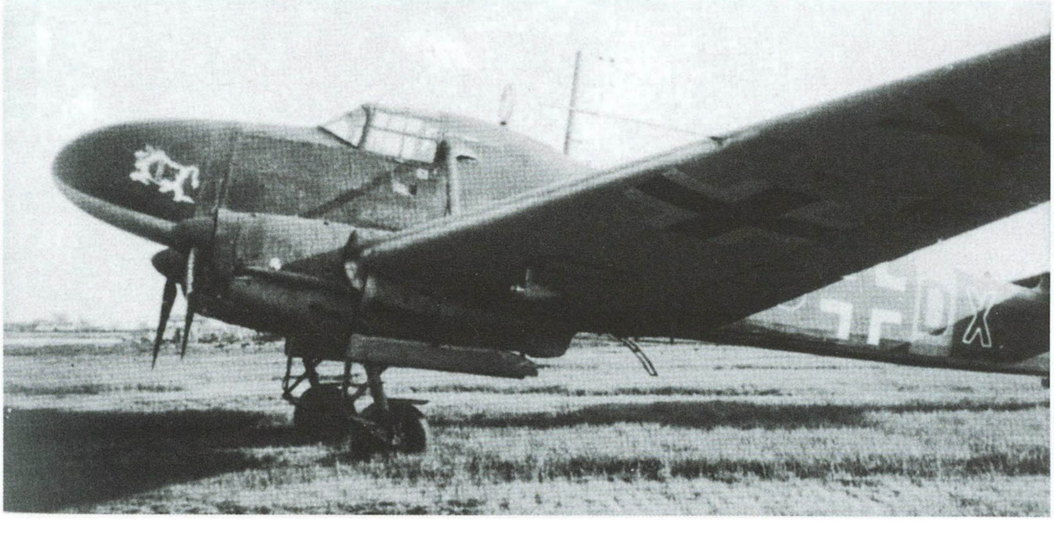
FFS A/B 71 Badge



A Fw 58 B-2 of KFS 4 based at Thorn (Torun) in occupied Poland, probably seen during early 1940. The aircraft has been repainted dark green over the earlier RLM Grau 02 finish as the wording appears on a lighter panel.



This Junkers Ju 52 was stationed at Königsberg-Devau and had the badge of the blindfolded cow sporting the shape of the East Prussian State on its side, which was applied to the front engine on the starboard side.



A Fw 58 belonging to blind flying school BFS 4. The emblem on the nose shows a blindfolded cow with the black patch on the cow having the shape of the German state the unit came from.

Junkers W 33 and W 34

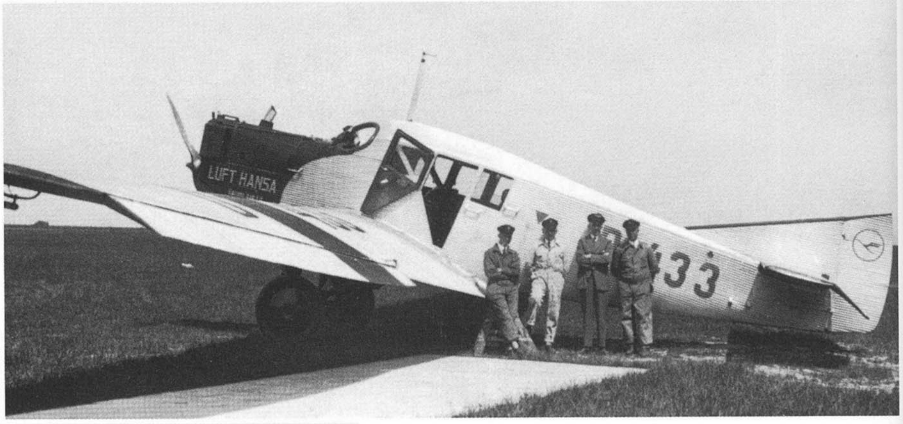
Close relatives of the very first all-metal monoplane transport, the Junkers F 13, the W 33 and W 34 were developed concurrently in 1926 on the same production line as the F 13, or so legend would have it. Differing from the F 13 by virtue of a fuselage with greatly enlarged capacity, greater engine power and a modified wing planform, the W 33 was a dedicated freighter with a 170 cubic foot cargo hold, while the W 34 was an airliner with accommodation for six passengers and two crew. In the early versions, the crew sat in an open cockpit, but the cabin was always totally enclosed. Most versions of the W 33 used in-line Junkers engines, while the W 34 used a variety of radials. Featuring the same rugged corrugated aluminium skinning which characterised the F 13, both versions were widely exported in the years before World War II. Built in both land and seaplane versions, the W 33 saw extensive overseas service with operators in such far-flung places as China, Canada and New Guinea and inaugurated Lufthansa's regular mail services. Only a few examples of the W 33 survived to see service in the *Luftwaffe*, that service generally preferring the W 34, probably on account of the more reliable radial engine fitted to the W 34.

Likewise, the W 34 was built in numerous versions from 1927 onwards, the first production W 34bs being D-1119 and D-1294. Airline operators using the W 34 were Eurasia in China, Lloyd Aero in Bolivia, Guinea Airways in New Guinea and several Canadian companies. Later developments of the basic design had enclosed cockpits for the crew, and two of these, the W 34hau with a 650 hp BMW Bramo 322 engine driving a four-bladed wooden propeller and the W 34hi powered by a 660 hp BMW 132A and two-blade propeller, both saw extensive service in the *Luftwaffe* training schools throughout World War II. About 100 examples of the W 34 are believed to have been built, the last in Sweden in 1935. For a time, the W 34 was standard *Luftwaffe* equipment, with spartan accommodation for up to twelve passengers, for advanced flight training, blind flying training and radio operator instruction.

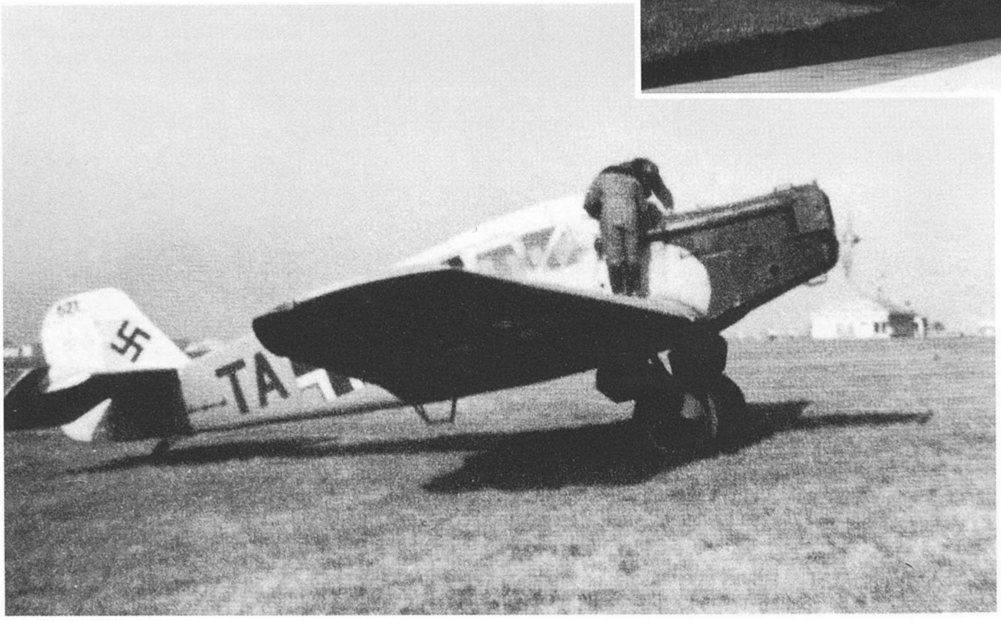
Despite being generally well behaved in the air, the marginal centre of gravity of the W 34 could give rise to some interesting moments on the landing run, and too-hasty application of the brakes frequently tipped the bird onto its nose. Units known to have operated the W 34 include FFS A/B 2, FFS A/B 5, FFS A/B 11, FFS A/B 14, FFS A 32, FFS B 1, FFS (C)3, BFS 33 and LKS 13.

Specification

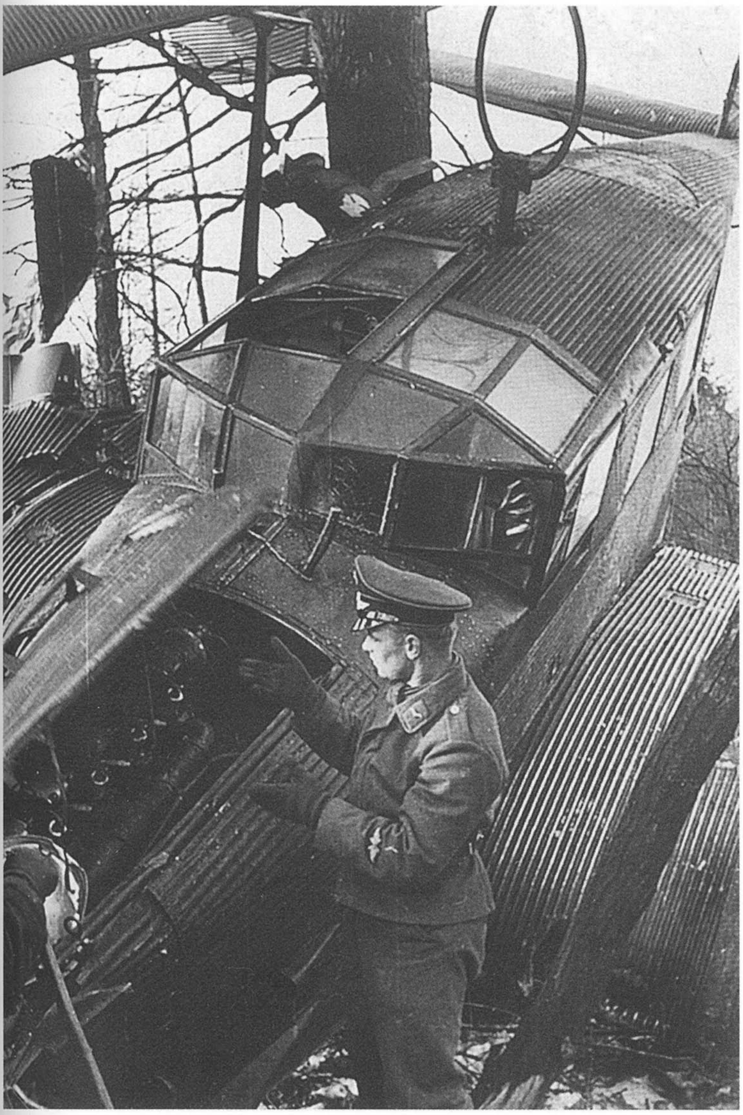
Span:	17.75 m (58 ft 2¾ in)
Length:	10.27 m (33 ft 8 in)
Loaded weight:	3,200 kg (7,056 lb)
Max speed:	265 km/h (165 mph)



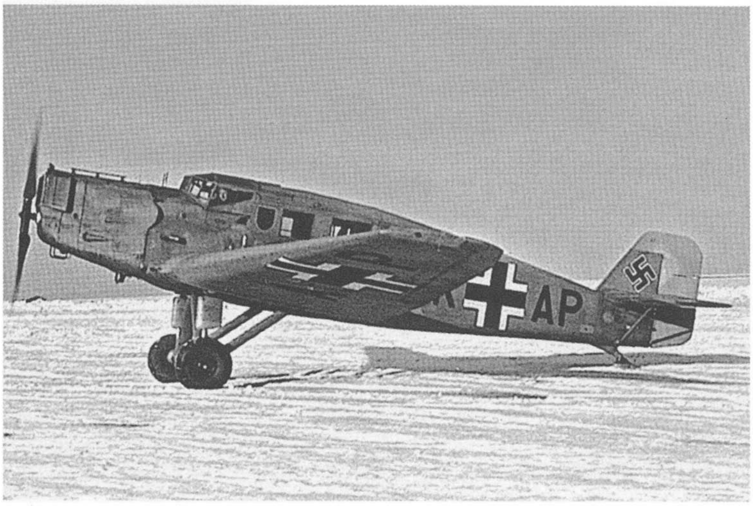
Ground crew pose in front of this early 1924 built Ju 34hi, W.Nr. 743, registered D-433, operated by Lufthansa and carrying the name 'Baumläufer' (Tree-racer).



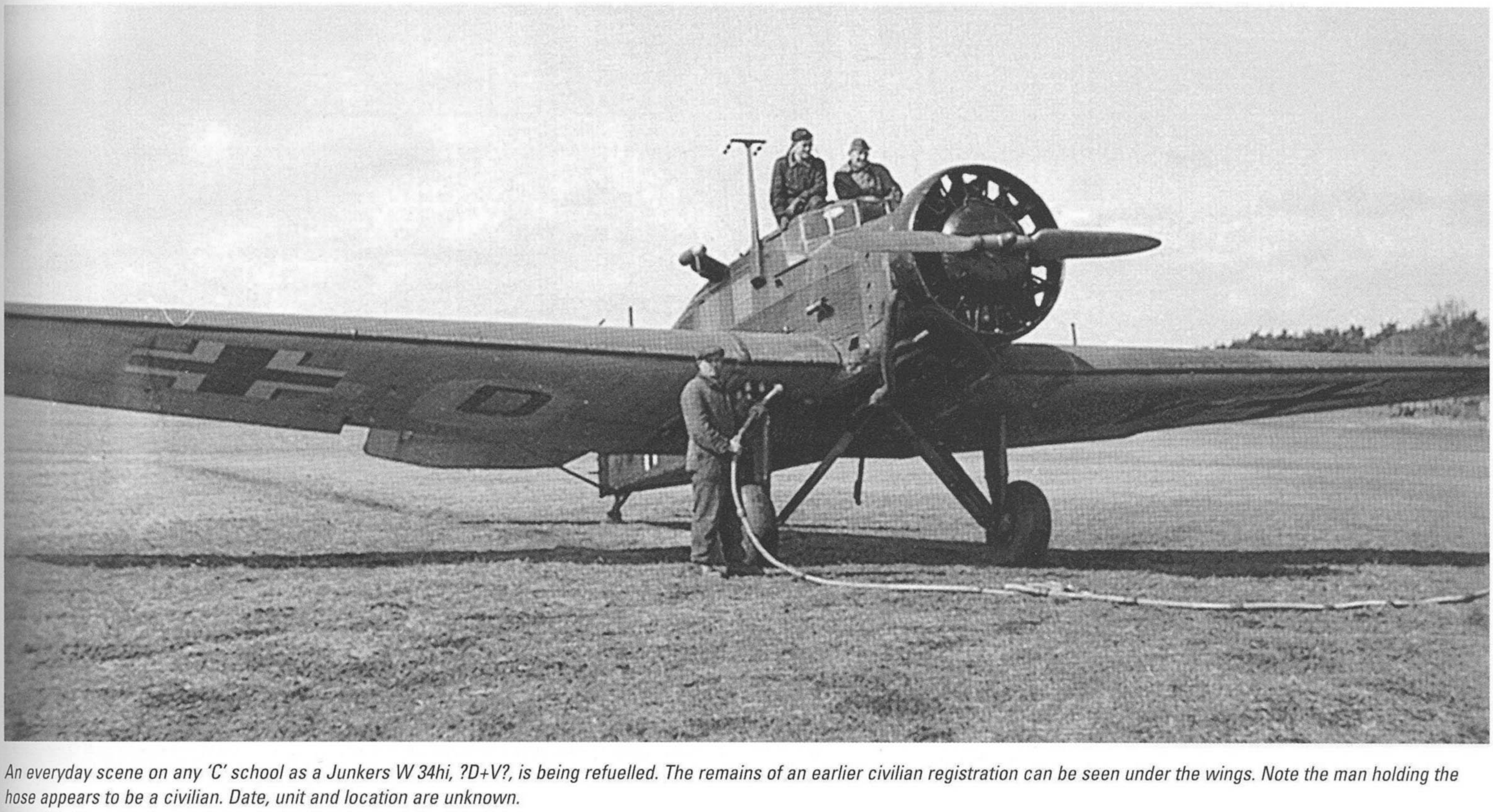
More than twenty years after the prototype first flew, odd examples of the venerable Junkers F 13, ancestor of the Ju 52/3m, were still to be found in service with the Luftwaffe training schools. A few even found employment in the night-harassing role on the Eastern Front armed with light bombs and machine guns. W.Nr. 621, seen here, coded TA+?? is probably in service with an unidentified training school. Its exact ancestry remains uncertain as it seems never to have appeared on the German civil register. Note the yellow tail.



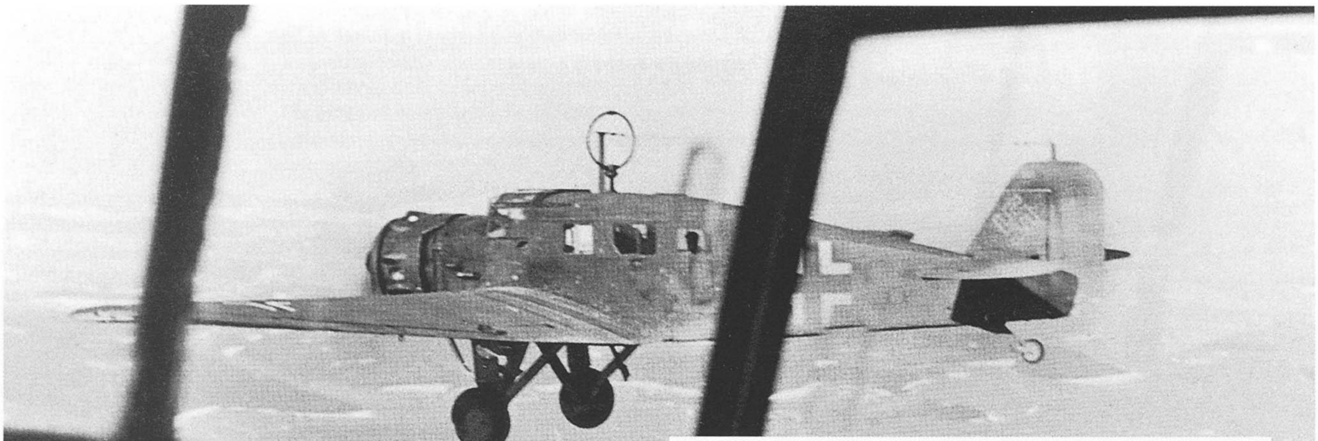
A Luftwaffe technical specialist gestures helplessly as he surveys the engine of a crashed and unidentified Junkers W 33, in-line engined brother to the radial-engined Junkers W 34. This picture may illustrate why the W 34 seems to have been preferred by the Luftwaffe – perhaps the radial engine was more reliable. The picture does show, however, that the W 33/W 34 series were strongly built.



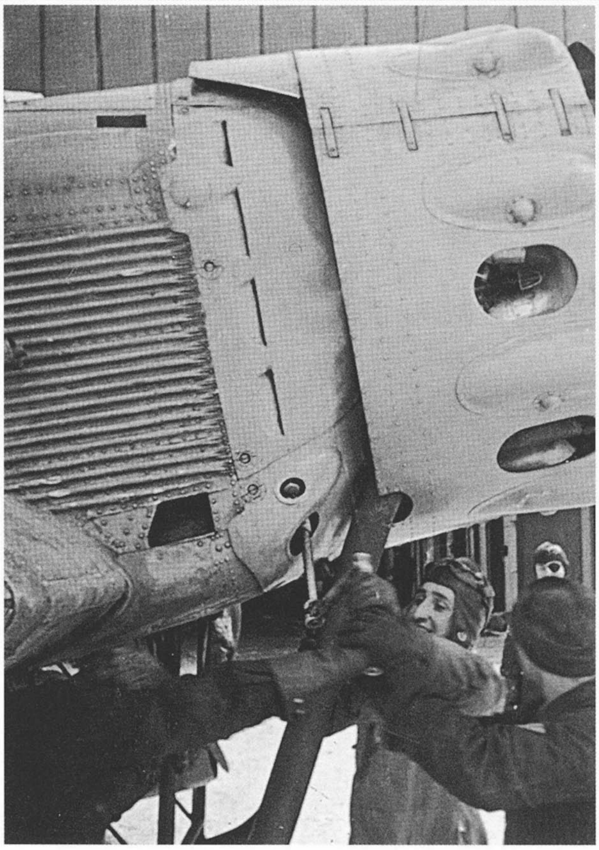
ABOVE: One of the less common types of aircraft in service with the Luftwaffe B and C flying schools, a Junkers W 33. ?K+AP may possibly be W.Nr. 2517, the last two digits of which are just visible on the rudder balance. If this is correct, then this machine had a very long life, being first registered as D-1384 in June 1928, and serving variously with Severa, DLH, the DVL and DVS. The dark shield shape just behind the cockpit window may be the unidentified unit insignia.



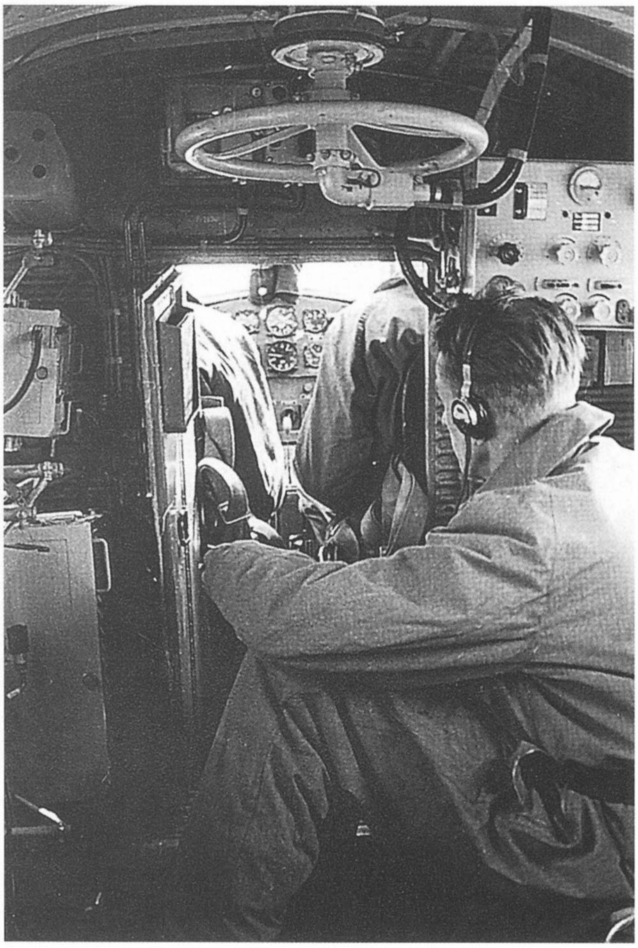
An everyday scene on any 'C' school as a Junkers W 34hi, ?D+V?, is being refuelled. The remains of an earlier civilian registration can be seen under the wings. Note the man holding the hose appears to be a civilian. Date, unit and location are unknown.



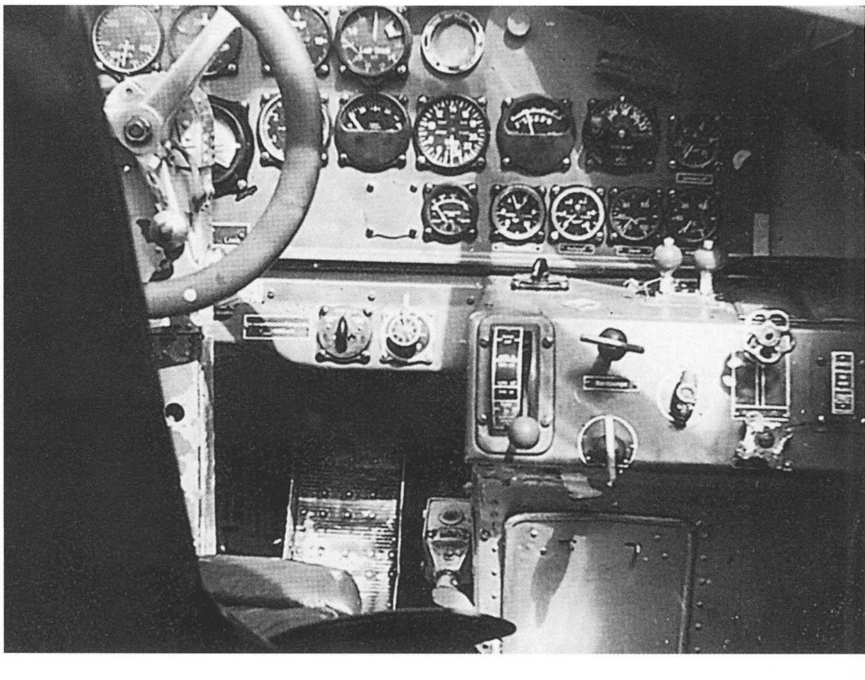
A well-worn Ju W 34, apparently with overall dark green uppersurfaces, with late-war type white outline crosses. It is believed to have been in service with FFS C1 at Bayreuth in 1943-44.



Student pilots from A/B 32 learning how to hand-crank the engine of a Junkers W 34. Chrudim, Czechoslovakia, January 1941.



ABOVE: The cabin of a Ju W 34 in use as a radio/navigational trainer. The massive handwheel is to allow the direction-finding loop to be rotated.



RIGHT: Instrument panel of a Junkers W 34. Note the rubberised coating to the wheel and the tidy layout of the instruments.

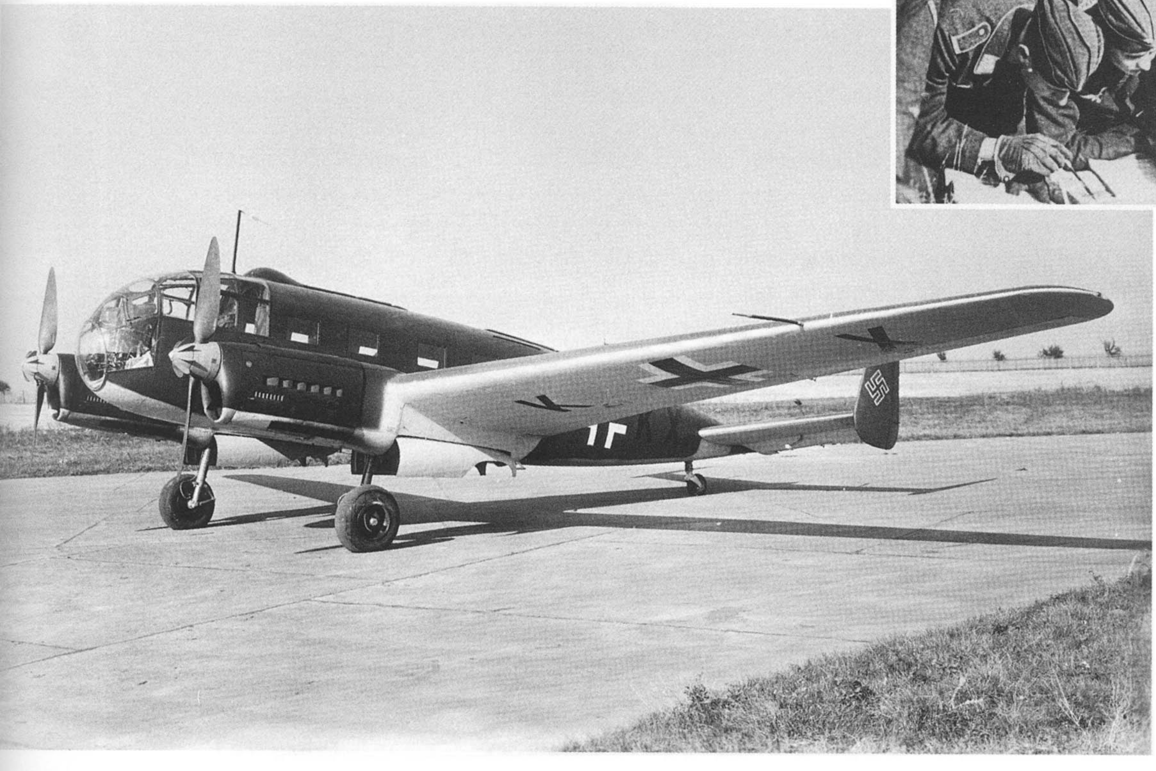
Siebel Si 204

A considerably enlarged development of the neat little Siebel Fh 104, the Siebel Si 204 was developed during 1940-41 by a team led by *Dipl.-Ing.* Fecher from Siebel Flugzeugwerke of Halle as a light transport, liaison aircraft and crew trainer. An all-metal low-wing monoplane with a dihedral tail with twin fins and rudders, the twin-engined machine could carry up to eight passengers and two crew. The Si 204 V1 first flew in May 1941, powered by two 360 hp Argus As 411 in-line engines driving two-bladed propellers and had a stepped windscreen similar to the Fh 104. Series production of the Si 204 A started shortly afterwards. A year later, the more powerful Si 204 D appeared, fitted with a bulbous glazed nose not unlike the Ju 188. Succeeding the Fw 58 into service as the standard *Luftwaffe* crew trainer, Si 204 aircraft were produced by SNCAC in France, who turned out about 150 between 1942 and the Liberation, and Aero in Czechoslovakia. Most of the Si 204 D models were produced in Czechoslovakia, approximately 1,007 being delivered between June 1942 and the end of 1944. Although most machines served as radio, radar or navigation trainers, armed versions were developed for use as light bombers, while a few even saw service as radar-equipped night fighters. The V22 and V23 served as prototypes for the Si 204 E fitted with a revolving glazed gun turret in the dorsal position mounting a single MG 131 machine gun and an internal bomb bay capable of carrying up to 500 kg of light bombs. Post-war, the agreeable flying characteristics and robust structure of the type led to development and production continuing in both France as the NC Martinet, and Czechoslovakia as the C-103/C-3. Units known to have used the Si 204 D include FFS (B) 11 and FFS (C)14. Data for Si 204D as follows:

Specification

Span:	21.33 m (39 ft 6 in)
Length:	11.95 m (39 ft $2^1/_2$ in)
Loaded weight:	5,600 kg (12,350 lb)
Max speed:	364 km/h (226 mph)

A Luftwaffe Oberfeldwebel giving navigation training and map reading standing in front of A Siebel Si 204. Note he is holding a 'Knemeyer' navigation aid which was invented by Siegfried Knemeyer and was standard equipment for all pilots and navigators.



A Si 204 D coded RU+KX at Prague-Ruzyne aerodrome in 1942 where the type was also manufactured by the Letov factory.

Miscellaneous Schools

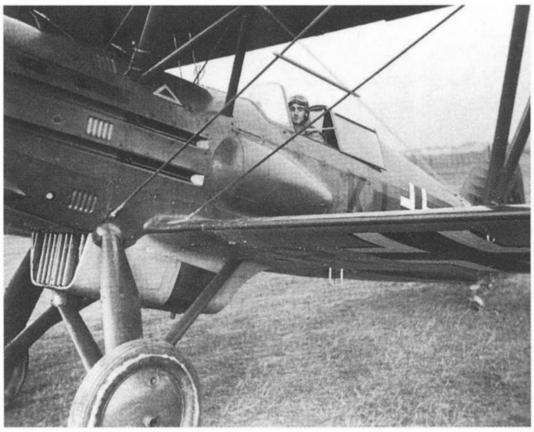
Some of the most important yet under-recorded elements of the *Luftwaffe*, were the transport glider units. Although towed close to their ultimate destination by powered aircraft, the ability to accurately land an engineless aircraft, often under enemy fire, required a very different form of training. For example, map reading and meteorology played a vital role in the operation of gliders, as did the successful co-ordination of tug and glider, singly and in formation.

Three glider schools were formed in 1940: the *Segelsflugschulen der Luftwaffe* based at Braunschweig-Waggum, *Fliegerschule d. Lw* (S) Gutenfeld and *Fliegerschule d. Lw* (S) 2 at Flensburg. A special unit was formed at Regensburg in 1941 to fly the monstrous Me 321 glider. By 1942 the original three schools had been reorganised into *Ergänzungsgruppen*, respectively ErgGr (S) 1, ErgGr (S) 2 and ErgGr f.Fsch.K.Beo. This last trained combat navigators for the *Fallschirmjäger* (paratroops) who, being part of the *Luftwaffe*, also flew gliders.

At the *Fliegerschulen* (*Schlepp*) (Flying Schools (Towed)), preliminary flight training began on civilian glider types such as the DFS *Kranich*, *Grunau Baby* and Göppingen *Minimoa*, although many of the would-be pilots had already had some flight experience with the NSFK or Hitler Youth on the SG 38. The next stage involved the military DFS 230 and various tugs such as the He 111, Do 17, Ju 87, Bf 110, Hs 126, Avia 534 and even odd Gloster Gladiators. Initially the trainee acquired his military glider pilot's badge after some 300 flights, but by 1942 this was reduced to 50 or 60 on the DFS 230. Eventually, the deteriorating war situation led to all glider units becoming part of the *Fallschirmjäger* in September 1944.

As in other air forces, other, even more highly specialised training units existed in the *Luftwaffe*, although little seems to have been recorded about their activities. For example, the *Flugzeug-führerüberprüfungsschule* (Aircrew Check-out School) based at Prenzlau, Pasewalk and Salzwedel; the *Fluglehrschule der Luftwaffe* (Flying Instructors School) at Brandenburg-Briest and the *Fliegerbildschule* at Hildesheim, which trained photographers between 1935 and 1945.

An Avia B.534 in use as an advanced fighter trainer of 1./JGr Drontheim in July 1941. Finished in dark green 'White 182', W.Nr. 575, has a yellow fin, rudder and nose to identify its status.



Czech-built Avia B.534 fighter-trainer, SD+NY, taxying across the field at Pilsen, Czechoslovakia, presumably in use by the instructors of FFS A/B 13.

One other training unit, unique to the *Luftwaffe*, was the *Lehrgeschwader* (Training Division). The need to evaluate new types of aircraft, equipment and tactics led to the establishment of a *Lehrgruppe* in Greifswald in 1936. Essentially, this consisted of a number of small units representative of the many kinds of flying units within the *Luftwaffe* formed into a larger size which simplified administration, but also allowed different combinations of equipment and tactics to be tried out. Examples of every item of equipment used by the *Luftwaffe* was delivered for testing to the *Lehrgruppe*, which worked in close cooperation with the RLM and the various test facilities such as Rechlin and Travemünde. Results from these experiments were then fed back into the *Luftwaffe* operational units. Eventually, the favourable experience obtained with this unit and the rapid expansion of the *Luftwaffe* led to two complete *Geschwader* being in existence by the outbreak of war. Their make-up was as shown right:

Geschwaderstab/LG 1	Greifswald
I.(Schw. Jagd)/LG 1	Barth (Heavy Fighters)
II.(Kampf)/LG 1	Schwerin (Bombers)
III.(Kampf)/LG 1	Greifswald (Bombers)
IV.(Stuka)/LG 1	Barth (Dive bombers)
Geschwaderstab/LG 2	Garz
I.(Jagd)/LG 2	Garz (Fighters)
II.(Schlacht)/LG2	Tutow (Ground Attack)
III.(Aufkl.)/LG 2	Jüterbog (Reconnaissance)
10.*(See)*/LG 2	Travemünde (Marine)
11.(NJ)/LG 2	Garz (Night fighters)

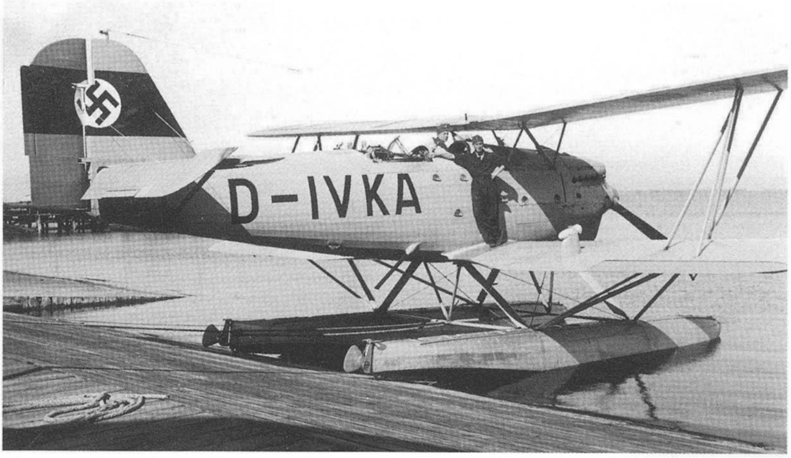
Perfectly capable of mounting actual operations, LG 1 in particular gained an enviable war record in its own right, possibly at the expense of its intended purpose as an evaluation unit.

Sea Eagles

One of the many organisational anomalies in the Nazi armed forces was that of the small naval air arm – the *Seeluftstreitkräfte*. In a not dissimilar structure to RAF Coastal Command, the actual units were under the command of a *Luftwaffe* General – the *General der Luftwaffe beim Oberkommando der Kriegsmarine,* Ob. d.M. for short – who in turn reported to the Naval High Command. As the RAF and Royal Navy also found, this arrangement gave ample opportunities for friction and confusion between the two services.

In the absence of ship-borne radar or aircraft carriers, the *Kriegsmarine* regarded the primary purpose of naval air power to be that of maritime reconnaissance, gunnery spotting and occasional minelaying and torpedo bombing. The designations of the operational maritime units – the *Küstenfliegergruppen* – reflected the primarily coastal nature of their duties. In any case, only the larger German naval vessels were capable of carrying aircraft, and these were only two-seat floatplanes suitable for short-range duties. The longer-distance search operations were to be carried out by land-based flying boats, attack capability generally resting with the He 115 floatplanes or land-based bombers. By 1943 most of the naval units had been absorbed into the *Luftwaffe* proper.

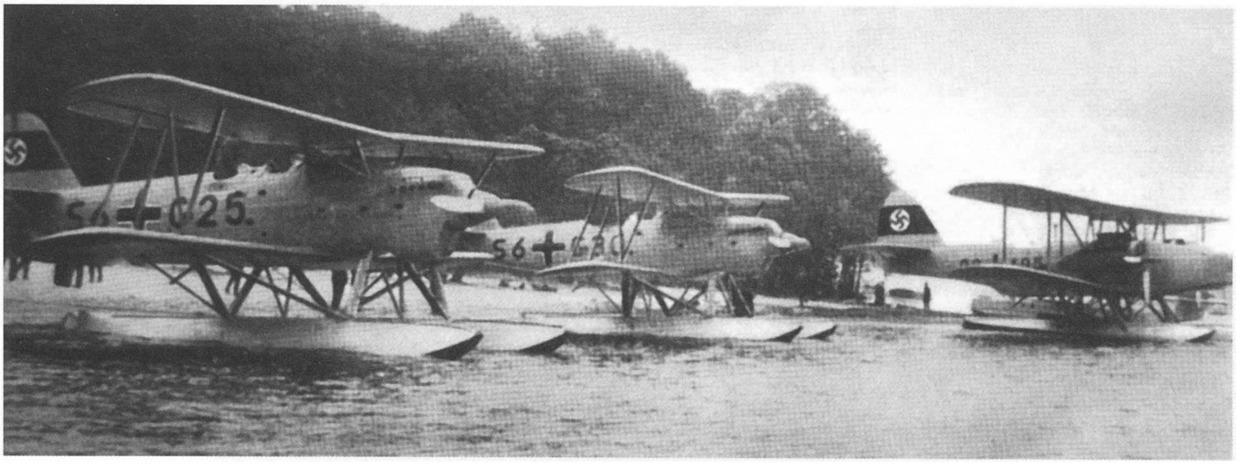
Lack of overwater navigational experience on the part of the *Luftwaffe* resulted in a similar situation to that of the British Fleet Air Arm in the years preceding World War II whereby most of the members of the crews in the maritime units were from the air force, but navigators and observers were naval personnel. Training was therefore geared to these ends. The specialist nature of marine air warfare, particularly the late development of aerial torpedo attacks upon shipping, led to the logical decision to base the *Flugzeugführerschulen (See)* – marine pilot training schools – around the pre-war experimental and testing stations on the Baltic coast at Warnemünde, Pütnitz and Stettin. Associated with the specialist training of naval aviators were three *Fliegerwaffenschulen (See)* – naval aviation weapons schools, i.e. OTUs. On 1 September 1939 these were as below:



An immaculate Heinkel He 60, D-IVKA, tied up to the slipway at Bug am Rügen, home of Fliegerwaffenschule (See) in 1936, at about the time the school was formed. It closed in December 1940. Finish is probably the standard for the type at the time – overall RLM Grau 02 with silver floats.

School	Date Formed	Main Bases Used	Comments
FWS *(See)*	January 1934	Parow	Originally DVS at Warnemünde
FWS *(See)*	February 1934	Bug am Rügen	So named in 1939
FWS *(See)*	March 1939	Dievenow	Transferred from Warnemünde

In January 1940, at the time of the wholesale redesignating of the *Luftwaffe's* training units, these schools were renumbered as A/B or C schools. Main aircraft equipment for the C2 advanced marine schools was usually an assortment of Dornier Wal and Do 18 flying boats



Two He 60 floatplanes, '25' and '30' of the FFS (See) at Pütnitz, probably sometime in 1938. In the background is a He 59, possibly from the Fliegerwaffenschule at Parow.

and He 59, He 60 and He 115 floatplanes, although a few floatplane variants of the Ju 52/3m and Ju W 34 also saw service. As the *Luftwaffe* asserted more control over the marine units, the equipment also changed, so that by June 1941 the BV 138, Ar 196 and Ju 88s were also in use with the marine *Ergänzungstaffeln*.

One other training school must be mentioned in connection with maritime operations, namely the *Torpedoschule* Grossenbrode, which was originally based at Travemünde on the Baltic coast. By 1941 it had a sub-station at Grosseto in Italy. Both parts were concerned with training *Luftwaffe* crews in the techniques of aerial minelaying and torpedo-dropping. In late November 1942 this involved extensive anti-shipping operations with KG 26 over the Mediterranean. At this time the school was renamed KSG 2 (*Kampfschulegeschwader* 2) consisting of two *Gruppen*, one using He 111s, the other Ju 88s. Between 1942-43, five to ten crews from the school were tasked with training crews from KG 26, KG 77 and KüFlGr 906 in day and night torpedo attacks. Following heavy fighting in the Mediterranean theatre, KSG 2 was renamed KG 102 and withdrawn to the Baltic in July 1943 to train KG 77 and crews intended for the aircraft carrier Graf Zeppelin. When this was abandoned, in July 1944 KG 102 was disbanded, the aircrews being dispersed and the aircraft and ground crews going to IV/KG 26.

EAGLES NO MORE

'The training for the blind-flying C pilot's licence was the longest, most costly, most complicated, and from the point of view of wartime operational effectiveness, most important aspect of the entire air training process' – Generalleutnant Werner Kreipe.

At the outbreak of the war, there were some 1,505 bombers, 1,325 fighters, 620 reconnaissance machines, 205 seaplanes and 450 transport aircraft in service with the *Luftwaffe*. Another 1,500 crews were under training in the weapons schools, so that there were about 5,000 crews available, representing some 15,000 men.

Generalleutnant Werner Kreipe

Belated recognition by the *Luftwaffe* General Staff that the war situation in early 1943 had finally forced the *Luftwaffe* to become a defensive, rather than an offensive, force led to the start of a fundamental shift in the composition of the air force. Despite stubborn resistance by Hitler to acknowledge the reality of the position, the more clear-sighted *Luftwaffe* commanders had seen the need for change in both tactics, aircraft production and the training of crews for these machines. Subsequently, the appointment of *Generalleutnant* Werner Kreipe as Chief of Training in June 1943, and the wholesale reappraisal of the training units which followed in October, led to a doubling in the output of crews by the beginning of 1944, despite a 20 per cent drop in the number of basic personnel. Not only this, but more modern aircraft had at last begun to reach the training units in 1943, with nearly 1,000 Fw 190 and Bf 109 fighters available in the fighter schools by late 1944. An indication of the shift in emphasis in the offensive/defensive capability of the *Luftwaffe* is reflected in the number and type of crews qualifying in 1942-43.

Crews	1942	1943
Bomber	1,962	3,231
Day Fighter	1,662	3,276
Night Fighter	239	1,358
Ground Attack	537	1,264
Reconnaissance	192	464

By 1943-44, the *Luftwaffe* had reached its maximum size with 2,089,000 men under arms. There were, however, several negative aspects to this apparently encouraging picture. Instructors remained in short supply and were a source of constant worry to *Generalleutnant* Adolf Galland, chief of the fighter arm, who was highly critical of the lack of long term planning responsible for such a situation. There was a lack of coordination between the schools and the operational units which meant that pilots would find different practices at the squadrons to those which they had been taught, and the lack of flying time meant that many pilots were still pre-occupied with the technicalities of flying when they arrived at their operational units.

Increasing demands from the battle fronts meant that by 1944 turnover of aircrew was such that in many units only the *Gruppe* and *Staffel* commanders had more than six months experience, while the majority of pilots had only seen active service for some 8 to 30 days. Not only this, but in order to achieve the required numbers of new pilots, their training had had to be drastically reduced with a consequent deterioration in quality. This was the situation in February 1944, when German plans to remedy the situation were violently overturned.

First, there was a renewed Allied bomber offensive aimed specifically at German aircraft production facilities – 23 airframe and 3 engine factories being attacked in that month. Even worse, the daylight bombers were accompanied all the way to the targets and back by long-range fighters. The shock to the German defence systems that this represented was enormous. Indeed, until the previous winter, the Research Branch of the RLM had been claiming that such a machine was a technical impossibility! At a stroke, all existing German plans for aircraft production and training were thrown into disarray. With the ability to strike almost at will anywhere within the Reich, the arrival of the American escort fighters was to prove a mortal blow.

Subject to the debilitating personality conflicts within the higher echelons of the *Luftwaffe* command, beset by growing shortages of fuel and instructors, forced into constant moves by the shrinking perimeters of the Reich and now no longer safe even on its own airfields, the training system was no longer capable of allowing the *Luftwaffe* to recuperate its strength. It was the beginning of the end. How far the training organisation had contracted by war's end, can be seen in a situation report of 22 March 1945 found in the files of *General* Karl Koller, last Chief of Staff of the *Luftwaffe*, which noted all the last remaining schools:

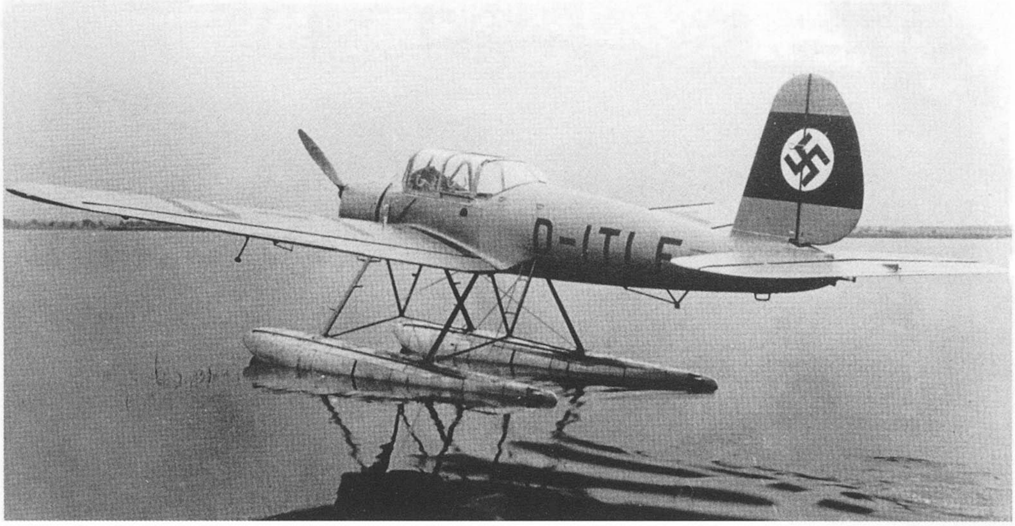
Table 15: **Remaining Luftwaffe Training Schools still under General der Fliegerausbildung as at 22 March 1945**

FFS A: 5, 23, 43, 114, 116
FFS B: 16, 31
I./SG 103, II./SG 103, I./SG 104, II./SG 104
I./JG 101, II./JG 101, I./JG 104, II./JG 104, I./JG 105 & I./JG 102, I./JG 106 and I./JG 108, I./JG 110 (closed 28 April 1945)
Fluglehrerschule
Fliegerbildschule
Navigationschule (closed 28 April 1945)
Verbandsführerschule General der Kampfflieger (closed 28 April 1945)
Bomben & Zielfinderschule (closed 28 April 1945)
Schiessschule (closed 20 April 1945)

Except where noted, all closed on 16 April 1945

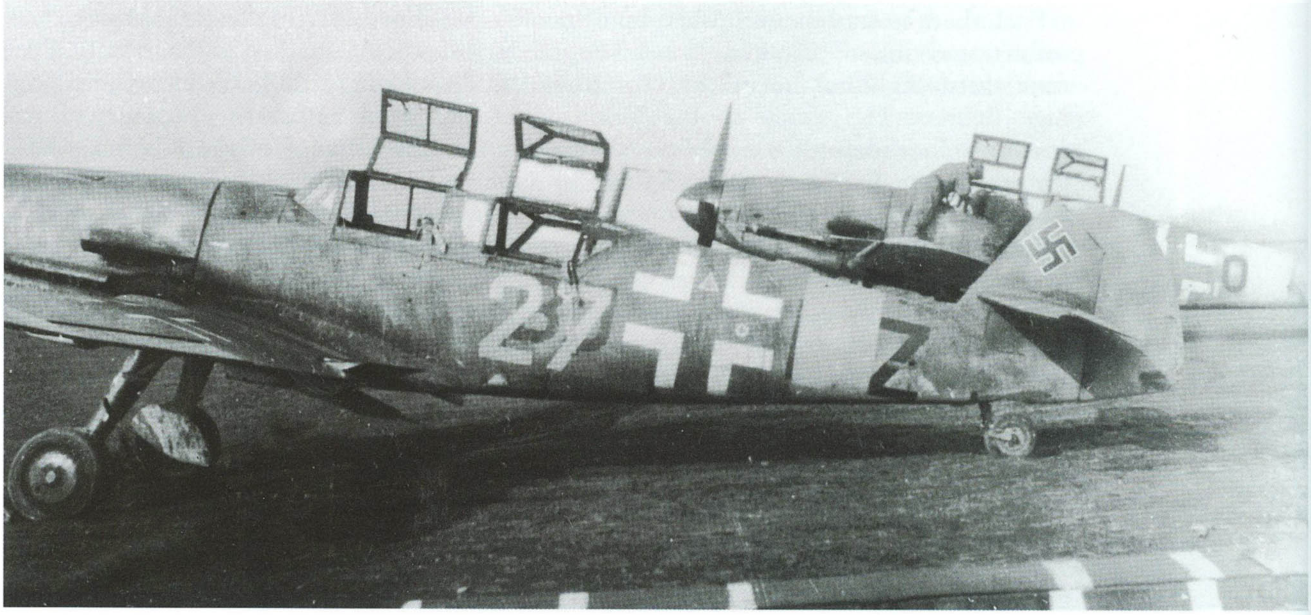
Ironically, by January 1945 the numbers of *Luftwaffe* flying personnel had reached an all-time high of 26,411 officers and 632,486 NCOs qualified as aircrew. The numbers were there, but not the vital element of quality. Products of the reduced standards of training prevailing at that stage of the war, these men were much inferior in terms of skill compared to those of the victorious air force of spring 1940, yet they were no less courageous. *Generalfeldmarschall* Erhard Milch may have overstated the case when he claimed that 'The *Luftwaffe* training programme, and with it the *Luftwaffe* itself, was throttled to death by the fuel shortage,' but there can be no arguing with the fact that between 1 September 1939 and 31 December 1944, 9,521 would-be airmen had been killed in training, while 5,993 were injured. Another 81,403 were killed, wounded, or went missing on operations.

Ultimately, the greatest tragedy of all for the *Luftwaffe* was the loss of fine men who sacrificed their loyalty and their lives on the altar of one man's ego; a man who cared for nobody and at the end betrayed them all.



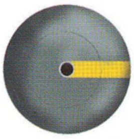
Ar 199 V-3, D-ITLF was the third prototype of this floatplane intended for training use. In the event, it was decided that obsolescent types would be used for this purpose so only five prototypes and a small batch of ten pre-production examples were built. Most found their way into Finnish hands for ASR duties. One, however, KK+BT, was used for training by 9. Seenotstaffel at Bug am Rügen in 1944. D-ITLF was allegedly recovered from a lake in Finland in 1993 for restoration.

RIGHT and BELOW: These Messerschmitt Bf 109 G-12s were operated by JG 101 in Pau, France during March 1944. The machines were probably converted from standard G-6 variants. The original factory code on the first machine is still visible as BJ+DZ but the unit number '27' in yellow has been applied over the first two letters. The aircraft has also been painted with a yellow tail band.

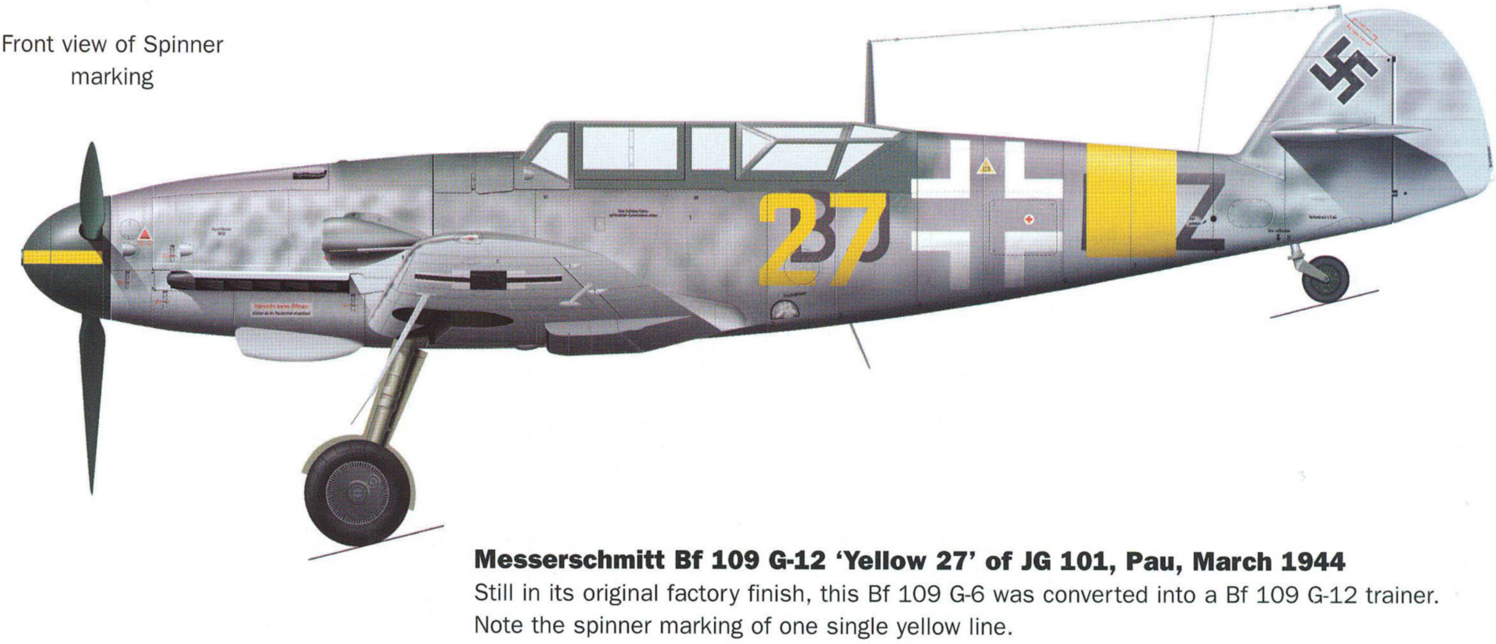


The pilot, in the pale flying suit, stands in the centre of some trainee pilots at Pau as they pose for the photograph.

Specification	
Span:	9.90 m (32 ft 5¾ ins)
Length:	8.92 m (29 ft 3 ins)
Loaded weight:	unknown
Max speed:	600 km/h at 6,000 m (373 mph at 19,700 ft)

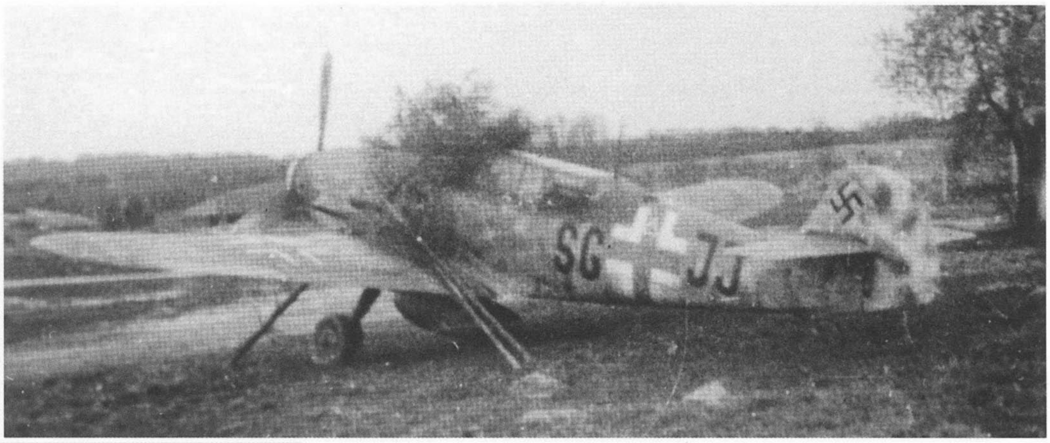


Front view of Spinner marking

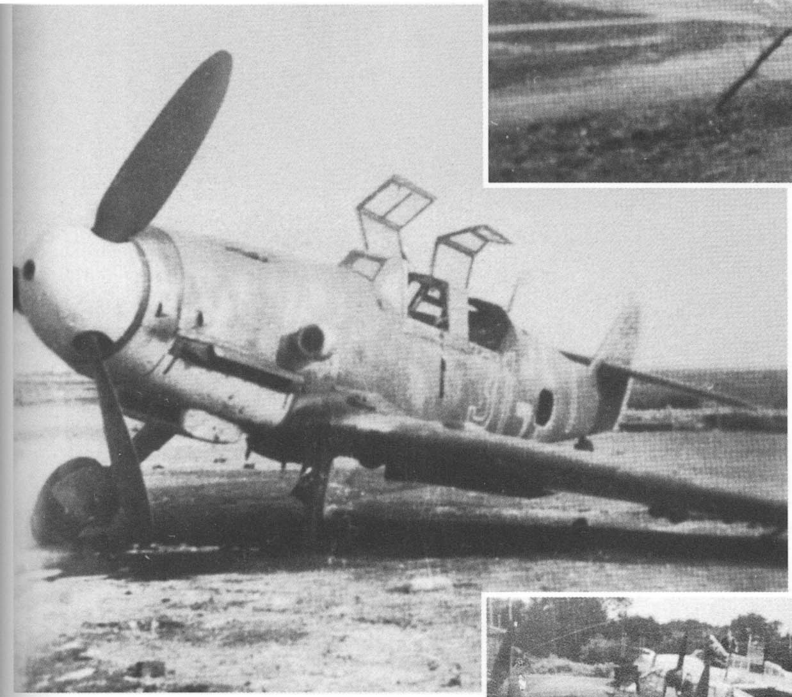


Messerschmitt Bf 109 G-12 'Yellow 27' of JG 101, Pau, March 1944

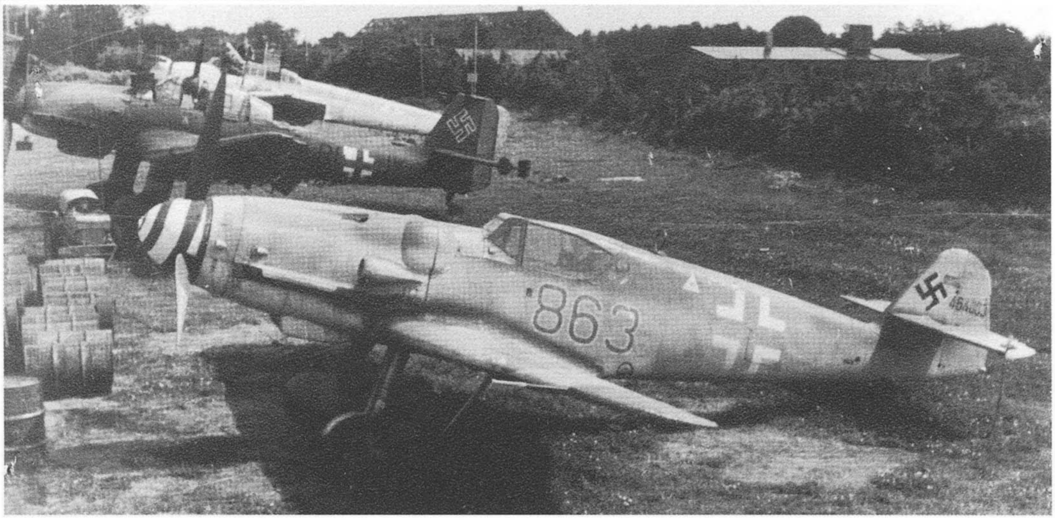
Still in its original factory finish, this Bf 109 G-6 was converted into a Bf 109 G-12 trainer. Note the spinner marking of one single yellow line.



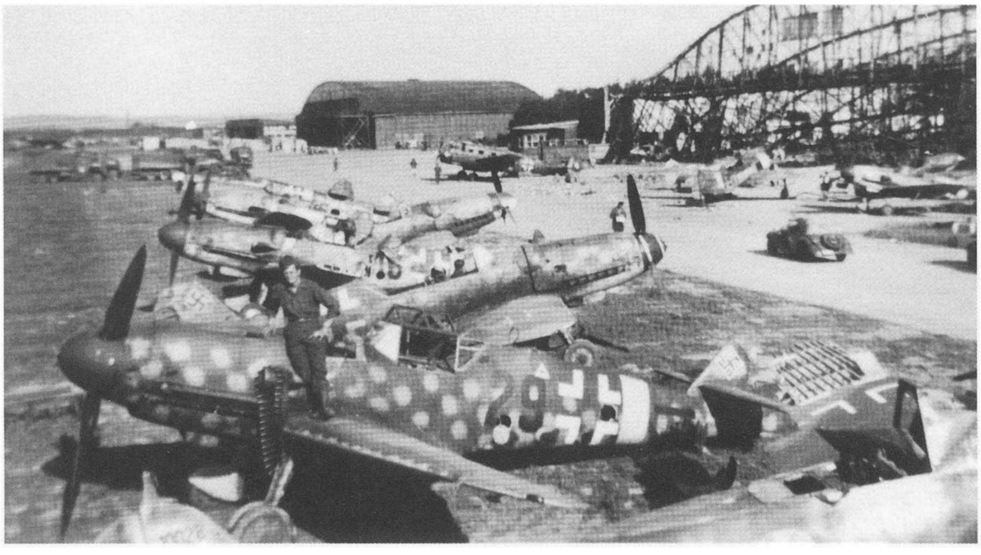
This Bf 109 G-12 trainer coded SG+JJ has also been fitted with a long-range drop tank. Due to constant attacks by Allied aircraft the Luftwaffe often made good use of parking their aircraft amongst the trees along the edge of airfields. Here the aircraft has also been partly covered in foliage from nearby trees and bushes.



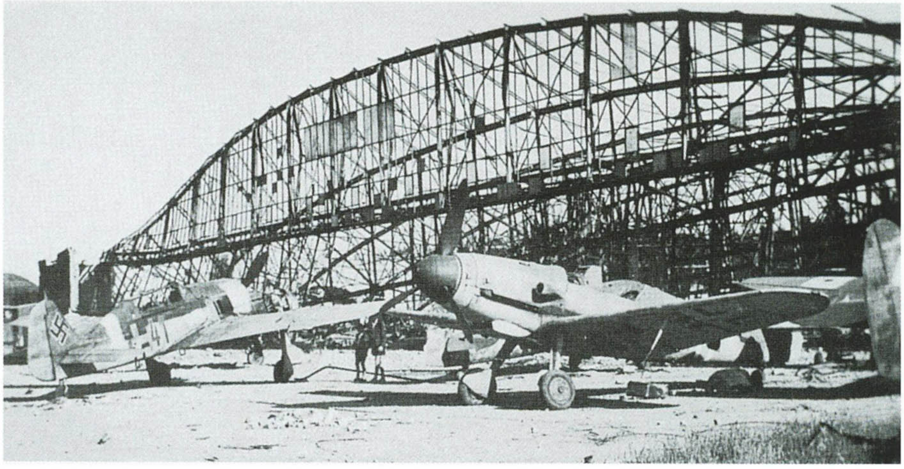
ABOVE: This converted Bf 109 G-6 trainer was found damaged after the end of the war. It carried the number red '31' outlined thinly in white under the rear cockpit. It also appears that as well as the spinner the rudder was also painted white.



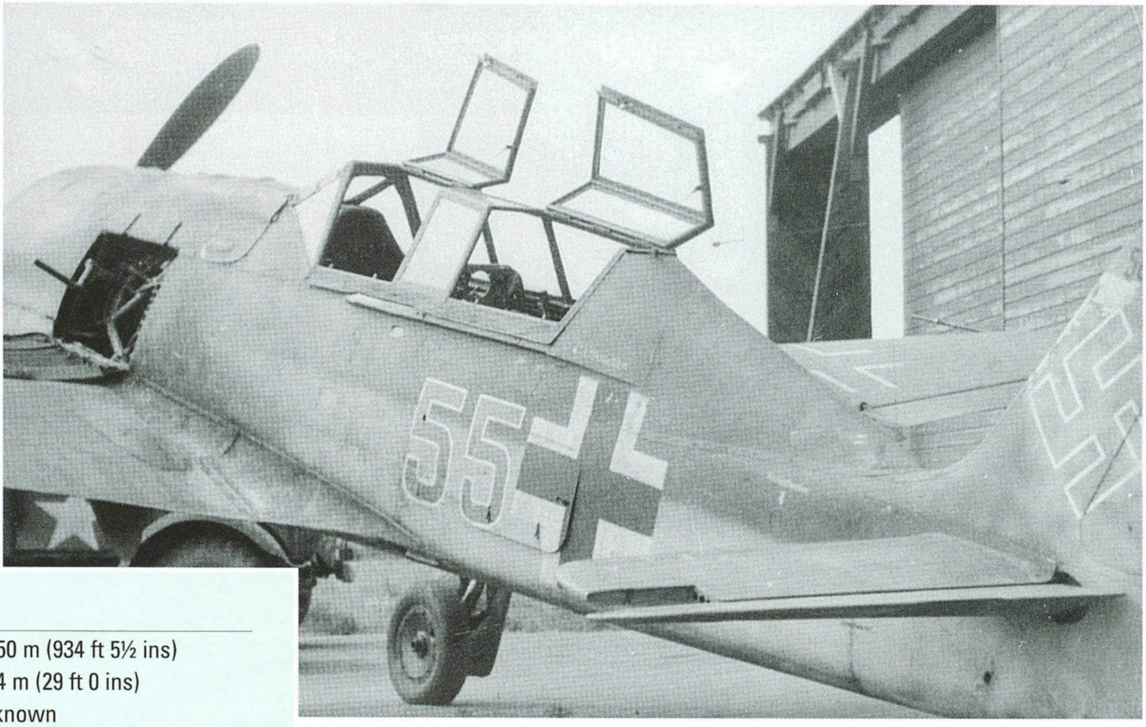
ABOVE: This Bf 109 G-14, W.Nr. 464863, was found by the British at Eggebek in northern Germany at the end of the war. It carried the tactical number '863' in red outlined in white under the cockpit which was typical of training units at the time. The machine was brought to Britain but its ultimate fate is unknown.



These mainly trainer versions of the Bf 109 G-6 and Fw 190 S-8 were found dotted around the airfield at Pilsen, Czechoslovakia in 1945. The occupying forces arranged all the aircraft in a line-up in front of one of the damaged hangars. A Siebel Si 204 can also be seen in the distance.



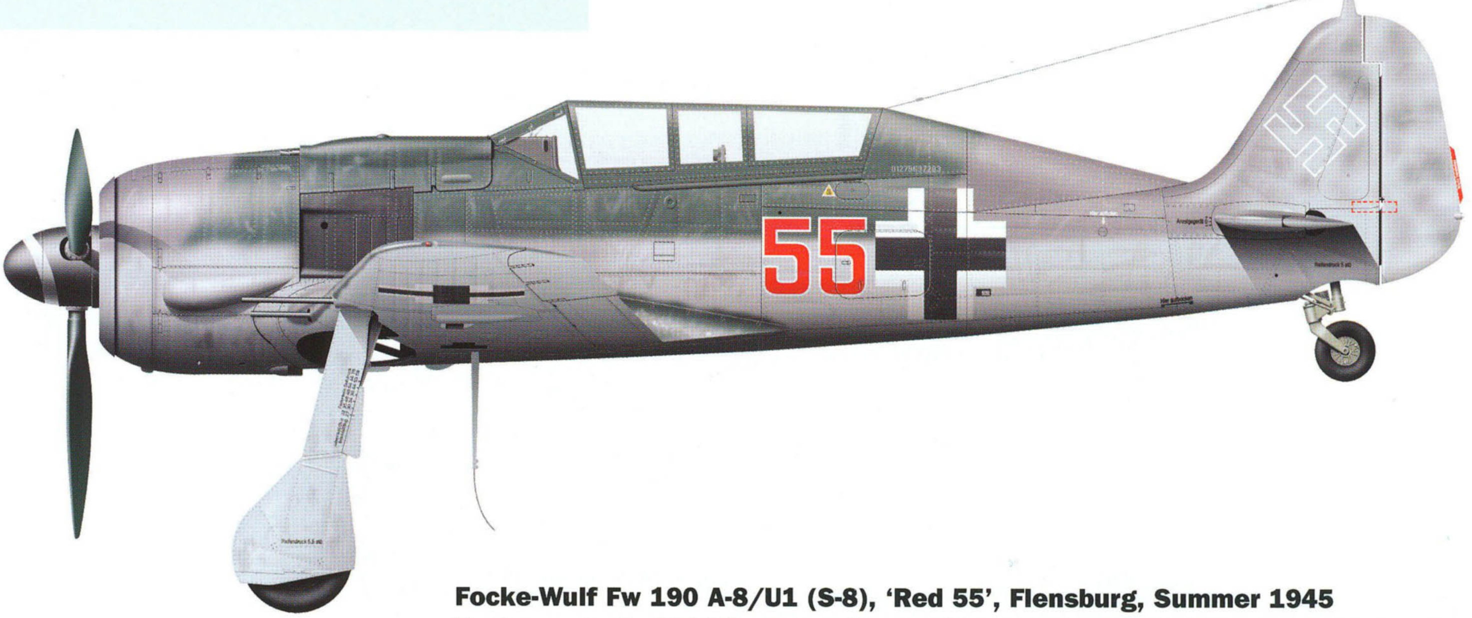
A close-up of a badly damaged hangar at Pilsen airfield in Czechoslovakia taken in May 1945, shows a Bf 109 G in the foreground with a Fw 190 S-8 behind. The Fw 190 may have belonged to I./Ergänzungs-kampfgeschwader (J) and carries the number 41 in blue outlined in white under the rear cockpit. It also had a yellow fuselage band just behind the Balkenkreuz.



RIGHT: This Fw 190 A-8/U1 (S-8) trainer of an unidentified unit was found by Allied troops at Flensburg. The machine had obviously attracted some interest as both cockpit hatches are open and there is also a starting handle attached to the engine. The number '55' was in red and was outlined thinly in white. Note the white star on a US vehicle parked in front of the aircraft.

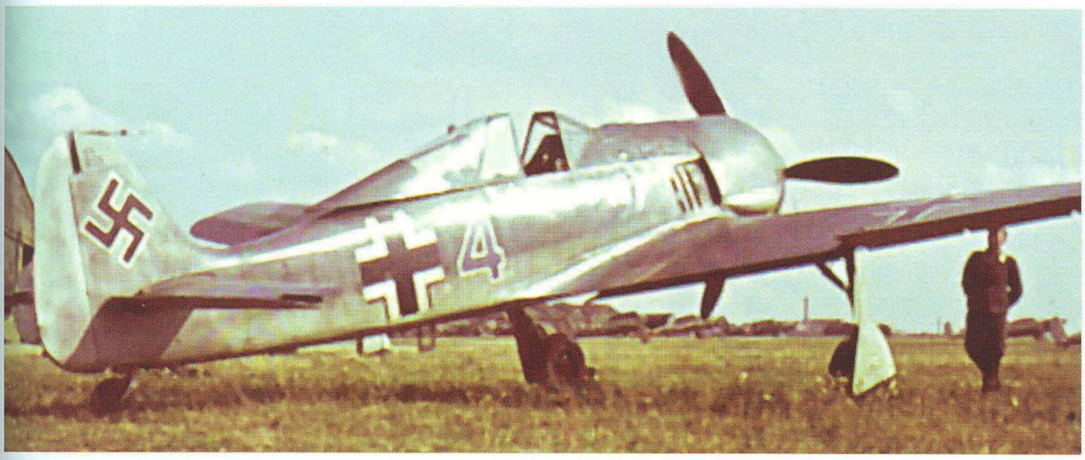
Specification

Span:	10.50 m (934 ft 5½ ins)
Length:	8.84 m (29 ft 0 ins)
Loaded weight:	unknown
Max speed:	unknown

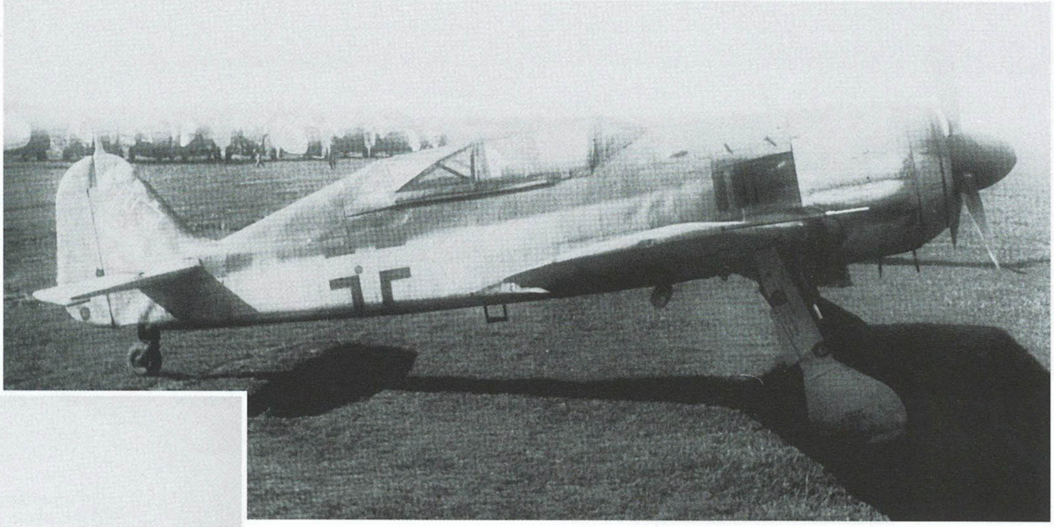


Focke-Wulf Fw 190 A-8/U1 (S-8), 'Red 55', Flensburg, Summer 1945

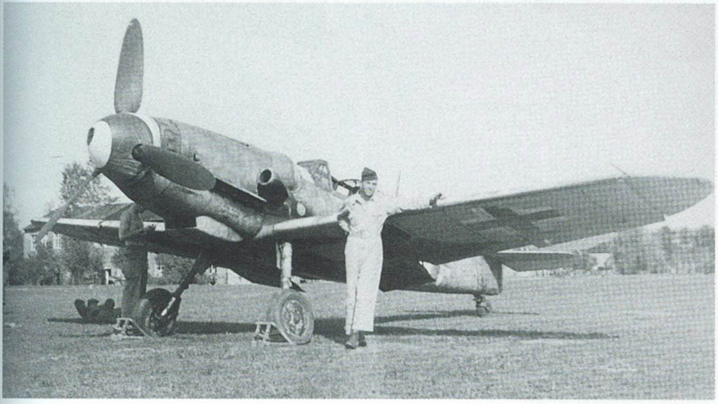
The two-seater Fw 190 S-8 was considered a fairly advanced trainer and this example had a simplified rear cockpit glazing design which did not allow any forward vision for the rear occupant.



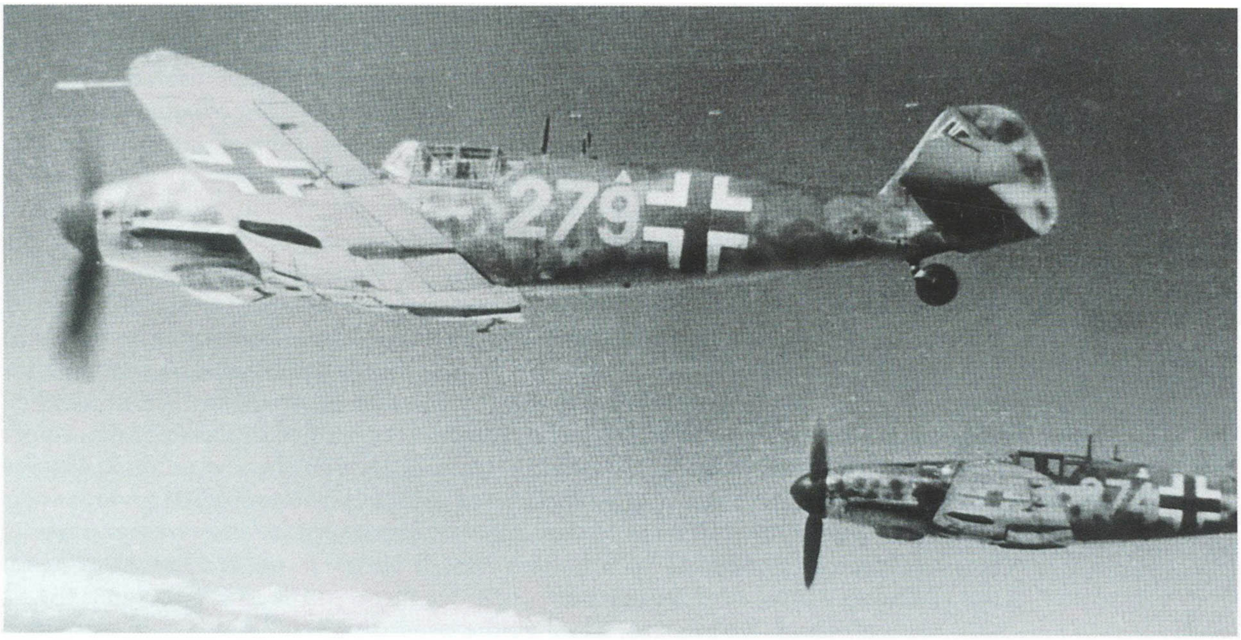
This Fw 190 A, 'Blue 4' served with Jagdfliegerschule 4. Camouflage was standard for the type and period – 74/75/76. Note the hard division between upper and lower surface colouring along the fuselage side area. The spinner tip was also marked in blue 24. In the background a line of Ar 96 trainers can just be seen.



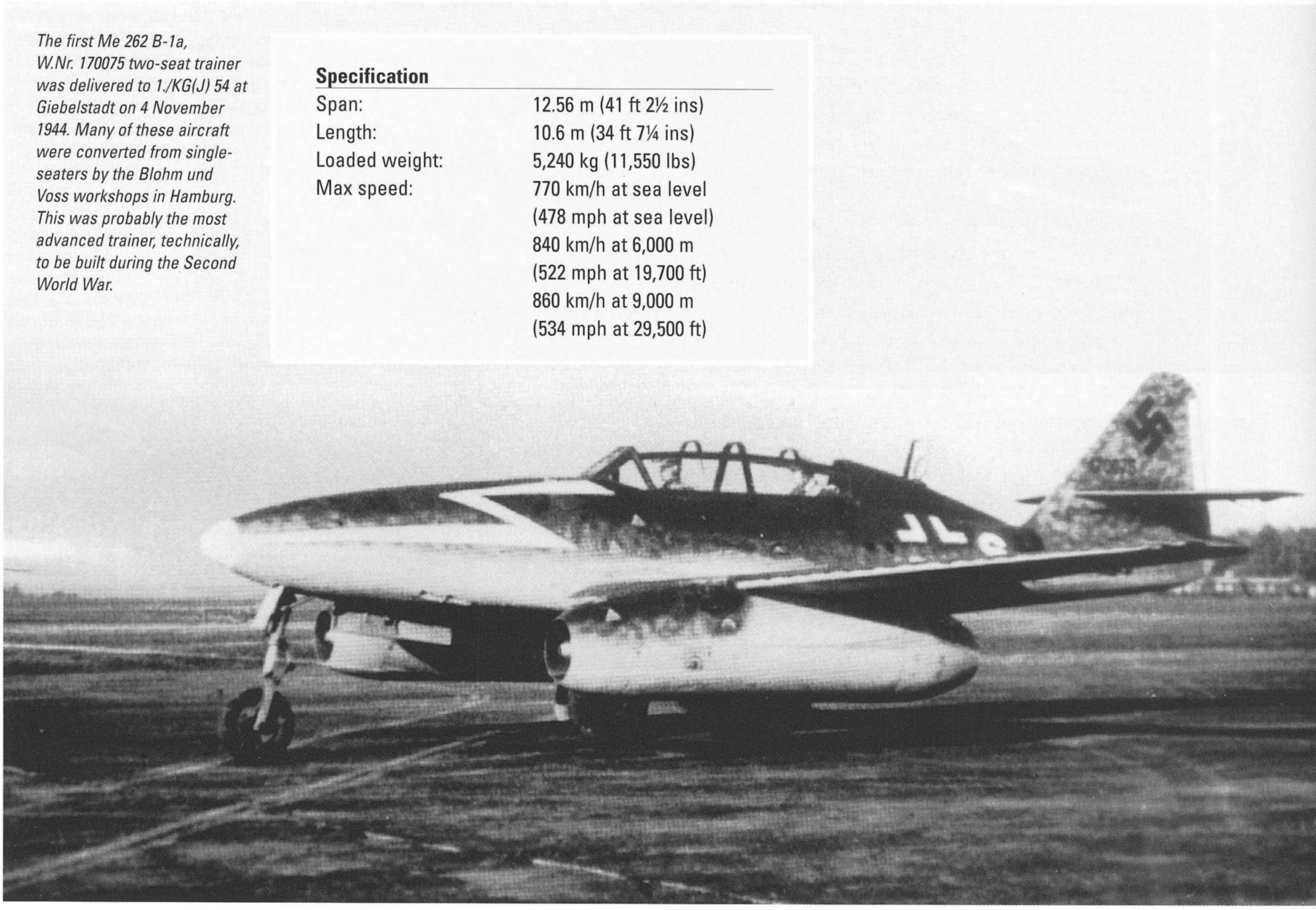
This Fw 190 S-8, W.Nr. 388047, wore a contemporary fighter camouflage of 74/75/76. Note the sharp division between upper and lower surface colouring and lack of mottling.



LEFT: This Bf 109 G-12, was photographed at Augsburg at the war's end. Its camouflage is enigmatic, but judging by the tonal difference between the 70-coloured propeller blades and the camouflage on the nose section, the colours were probably 74/75/76 with the sides heavily mottled in both colours plus probably 02. The quality of the 76 on the lower surfaces also points to this, it being a richer shade of colour than that seen on new production aircraft in 1944. A narrow yellow band – marking its training status – can be seen around the rear section of the fuselage. (J. Weidman via M. Olmsted)



Used for final operational conversion training, these Bf 109 G-6 aircraft had standard 74/75/76 camouflage with the addition of identifying numbers for the aircraft within the school, in this case in 04.



The first Me 262 B-1a, W.Nr. 170075 two-seat trainer was delivered to 1./KG(J) 54 at Giebelstadt on 4 November 1944. Many of these aircraft were converted from single-seaters by the Blohm und Voss workshops in Hamburg. This was probably the most advanced trainer, technically, to be built during the Second World War.

Specification

Span:	12.56 m (41 ft 2½ ins)
Length:	10.6 m (34 ft 7¼ ins)
Loaded weight:	5,240 kg (11,550 lbs)
Max speed:	770 km/h at sea level (478 mph at sea level) 840 km/h at 6,000 m (522 mph at 19,700 ft) 860 km/h at 9,000 m (534 mph at 29,500 ft)

Advanced Trainers

MARKINGS & COLOURS

In the days before the *Luftwaffe* officially emerged into the daylight, all aircraft in service were classified as 'civilian'. From 20 March 1934, after the Nazi Party had gained power, the civil registration system was extensively revised. Previously, aircraft were identified by a combination letter/number code. For instance, a BFW M.23b light floatplane belonging to the Messerschmitt factory in 1930 was registered D-1836 and an early Heinkel He 60 B in service with the RDL *Erprobungsstelle* Travemünde was registered D-2325. 'D' of course identified *Deutschland*. The new system introduced by the Nazis consisted of the D-prefix followed by a four-letter combination and is explained earlier in this text. This system prevailed until the spring of 1936, when the first of a rapid series of changes took place.

Aircraft in service with first-line units began to display a narrow straight-sided cross, similar to that used in late 1918, inserted into the registration letters on the fuselage and at the end of the registration on the wings. Needless to say, this resulted in some very crowded lettering. By June, further revisions took place. The first was the mandatory display of the *Hakenkreuz* or swastika on both sides of the fin instead of only on the port side as previously. This was in black on a white disc, centred on a red band and applied to all aircraft.

The other change was the use of military codes using letter/number combinations. It is not proposed to discuss how these new regulations affected operational machines here, only those in use as trainers. In May 1936, a code consisting of five digits, the first of which was the letter 'S' to signify 'school', appeared on training aircraft. The second digit was a number between 1 and 8, alleged to identify the type of aircraft. For example, '2' meant a long-range reconnaissance aircraft, '3' a fighter. An alternative theory has these second numbers as showing the home *Luftkreis* (of which there were 8) of the school. The next digit was another letter, followed by two or three numbers. However, neither explanation accounts for 'S13' and 'S17', both of which are known. Whatever the original intention, it is now clear that it was the combination of the first three/four characters that identified the unit, the last numbers the individual aircraft. This system appears to have been mostly used by larger, often ex-operational armed aircraft, relegated to training duties. For example, a He 70 with the code 'S4+Q22' was aircraft '22' of FFS E A/B Quakenbrück; 'S7+B155' was a He 45, aircraft '155' of KFS 3 at Lechfeld; while 'S17+M27' indicated a Fw 58, '27' of LNS 2. More uncommon was a Fw 56 in use with LKS Dresden in August 1939 and marked 'S3+K03'. At least 85 schools are now known to have used this system, although space precludes including a full list here.

Until January 1939, dedicated unarmed training aircraft used purely civil registrations. From that date, the D- prefix was supposed to have been deleted and substituted by the letters WL (*Wehrmacht Luft*). The difficulties in applying this change to large numbers of aircraft can be imagined. The outbreak of war in September 1939 resulted in an order to apply the *Balkenkreuz* (bar cross) to all military aircraft. In many cases there was simply no room – the hyphen dividing the WL from the other four letters was therefore used as a basis for a cross.

Change quickly followed change, when the WL registrations were abolished in October 1939 in favour of the simpler system, which was to endure for the rest of the war. This consisted of four letters and gave an enormous number of potential combinations. Essentially, the system ran in alphabetical progression i.e. AA+AA to AA+AZ, then AA+BA to AA+BZ, and so on. Both manufacturers and training units were allocated blocks of letters, among which were gaps for security purposes. These letters were almost invariably painted in black on the fuselage sides and underwing, but also occasionally on the top surface of the upper wing on biplanes. When dark uppersurfaces began to appear later in the war, the fuselage letters were frequently thinly outlined in white.

There is a suggestion that in the early days the first two or three letters sometimes served to identify units ('*Verbandskennzeichen*'). For example, a number of Klemm Kl 25 aircraft based at Marienbad with A/B 63 in 1940-41 all carried the code PF+VX, while others of the same type bore the code PF+WX. This theory, however, is complicated by the sequential letters issued to many manufacturers, such as the batch of Arado Ar 96s which included the codes GV+CE, GV+CI, GV+CV, etc, ('*Stammkennzeichen*'). It seems therefore more likely that the codes simply reflect numbers of aircraft being delivered simultaneously to a unit. Needless to say, transfers, accidents and later arrivals all served to confuse matters even more.

A simpler means of identification was often seen on aircraft on training airfields later in the war. This consisted of a large prominently sized number, of up to three digits, usually painted in white or yellow on some convenient area of the fuselage of the aircraft. These were probably given to individual aircraft on an airfield without regard to type. In some units, such as JFS 1 at Werneuchen, these numbers were applied in black or white on to an approximately 1-metre wide white or red band applied over the four-letter codes and on the upper wing centre section on biplanes.

Training aircraft also carried the same range of crosses and swastikas as worn by other machines. These ranged from extra-large wing crosses of the early war period to the white outline-only type seen much later in the war, although many training machines seem to have survived for years in their original finish. Indeed, at least one Klemm Kl 25 survived to be captured in 1945 still in its original pre-war silver dope and civilian markings.

A less obvious marking, but one frequently seen on machines during the early part of the war, was a small data table, usually near the tail of the aircraft, which gave the type of aircraft and the address and telephone number of the training school to which it was attached – a useful feature in the event of forced landings away from base.

Special markings were carried by some aircraft. Those in use as blind-flying trainers carried double yellow bands around the fuselage, while the Bü 133 types retained a spectacular white-outlined green (not red) flash down their fuselage sides. On some aircraft, a large inverted red triangle was applied to the fuselage, more or less in line with the wing leading edge. It is believed that this was a propeller hazard marking.

An uncommon marking seen occasionally was a small letter 'K' painted close to the cockpit indicating '*kunstflugtauglichkeit*' indicating that the aircraft had been cleared for aerobatics. One example was a Fw 44, BB+LA, of A/B 112 in September 1940. Very rarely, a training aircraft carried a personal marking, most of those noted being girls' names, possibly those of the wives or girlfriends of the instructors. Finally, most flying schools had their unit emblem which was painted on many aircraft, even late in the war when conditions for training were very difficult.

Colours

As might be expected, *Luftwaffe* trainers followed the general rules regarding the painting of German aircraft, but unlike their RAF or USAAF equivalents, had no special camouflage patterns. In view of the enormous drain on resources involved in repainting aircraft, trainers could be seen in their original paint schemes long after they were first built.

In the early days, all aircraft were finished in silver dope (RLM 01), often with the fuselage spine painted in dark blue or green as an anti-glare measure. An example is a Fw 44 B, D-EVYM, in service with an unknown unit in 1936.

Later deliveries were more usually finished in the standard all-purpose greenish-grey, RLM 02 *Grau* or RLM 63, often with a glossy appearance. Bücker types were often finished in a light '*Perlweiss*' – pearl-grey colour. Training gliders were almost invariably finished in the light ivory colour, RLM 05, often combined with blue 'sunray' markings on the wings. This single overall colour remained the standard finish until increasing numbers of Allied fighters began to make life dangerous for the trainees. Orders were consequently issued that from 21 January 1942 all training aircraft finished in light colours were to receive an overall coat of a dark green, RLM 70 and/or 71, on the uppersurfaces, to serve as camouflage both in the air and on the ground. With the advent of the darker finishes, yellow bands, wingtips, rudders or cowlings similar to those used on the Eastern Front were applied for safety reasons. Eventually, in response to the deteriorating war situation, an order dated 1 July 1944 stipulated that training gliders, until then left in their ivory finish, were to be camouflaged in the new RLM 80/81 colours.

Obsolescent aircraft relegated to training rarely changed their operational colour schemes except where necessary to carry their new unit markings. The result was an often amazing variety of colour schemes on a training airfield.

As the net tightened around Germany, there arose a general need for quick identification markings. Consequently, an order on 20 July 1944 required that all fighters, ground attack and reconnaissance machines were to carry a white spiral on black propeller spinners; captured aircraft were also to carry this marking and the wing undersurfaces inboard from the tips painted yellow to an amount equal to one-third of the span. Civil aircraft were to receive yellow paint under the fuselage, on the whole of the engine cowlings and the rudder. With the intensifying air war over Germany, however, the distinction between civil and military aircraft became increasingly blurred and it is probable that the yellow underside to the fuselage was only applied in exceptional cases. With the exception of the yellow fuselage undersurface this scheme resembled that worn by many trainers. Captured enemy aircraft in use as trainers almost invariably received an overall coat of yellow (RLM 04) on their undersurfaces to identify them as 'friendly', although as ever with the *Luftwaffe*, there were many exceptions to the rule, as the photographs in this book will show.

This Me 262 A-1a 'White 17', W.Nr. 110956, was delivered to III./EJG 2 at Lechfeld and was flown by Fw. Franz Holzinger on 16 March 1945. It was captured at Lechfeld on 29 April 1945. The white letter 'S' in the centre of the fuselage cross indicates that the aircraft had been downgraded to a Schulemaschine and was only to be used for training purposes, not combat.